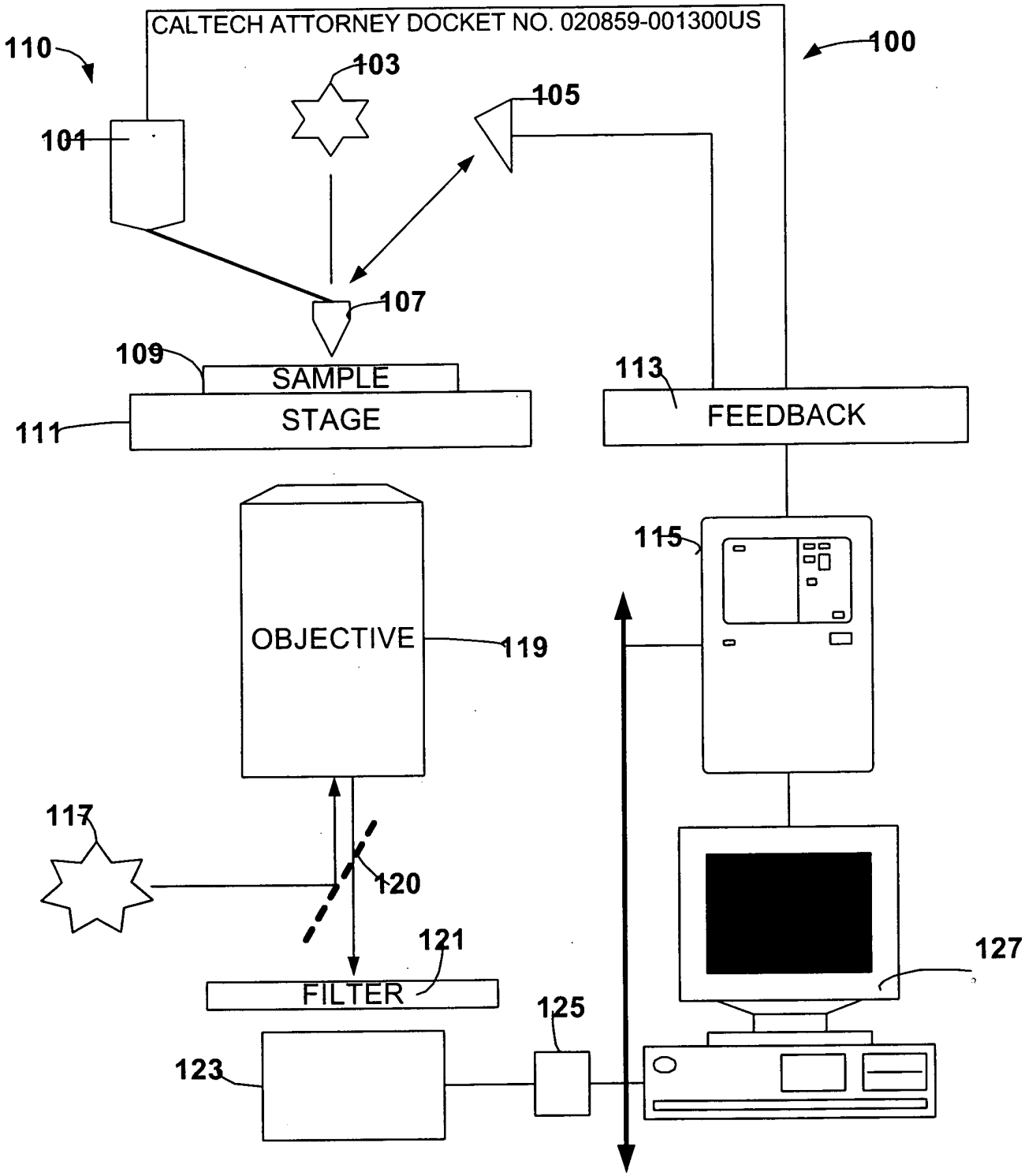

CALTECH ATTORNEY DOCKET NO. 020859-001300US
110
100
103
105
101
107
109
SAMPLE
113
STAGE
FEEDBACK
111
115
OBJECTIVE
119
117
120
121
127
FILTER
125
123

FIGURE 1

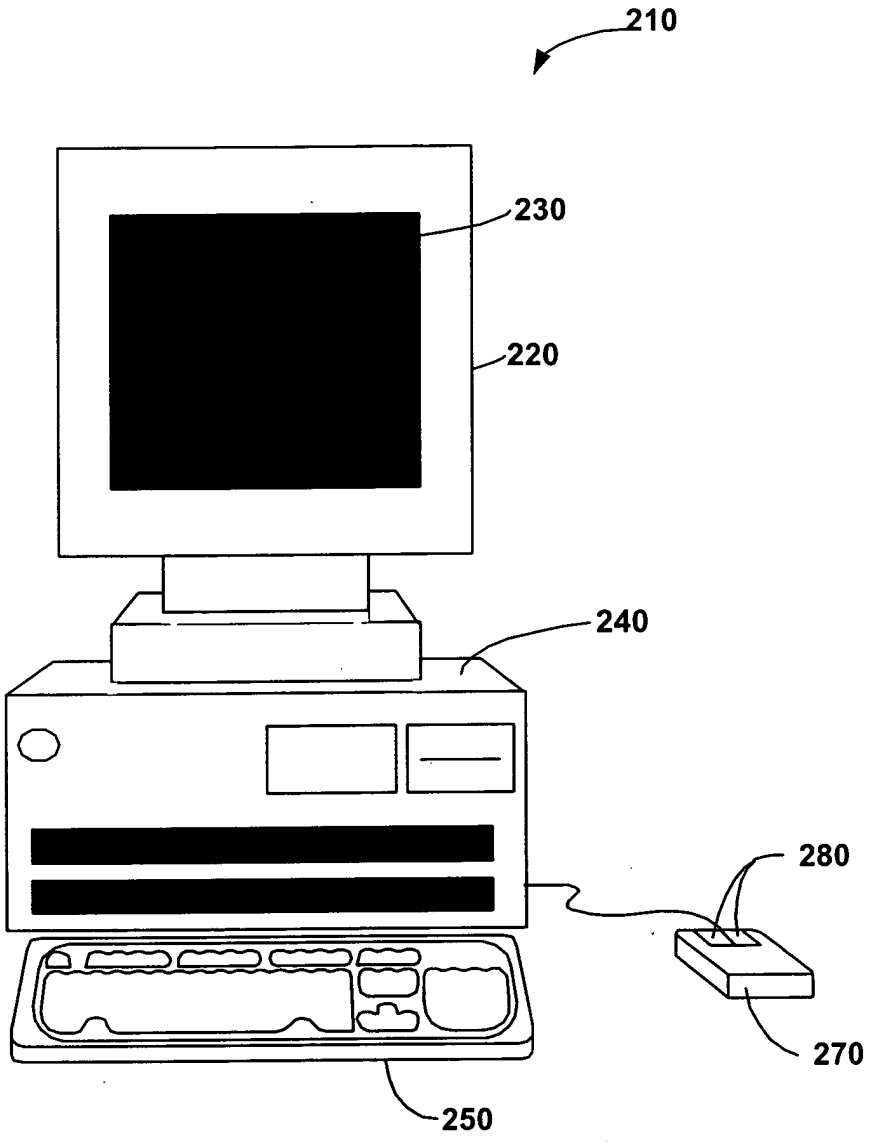


FIGURE 2

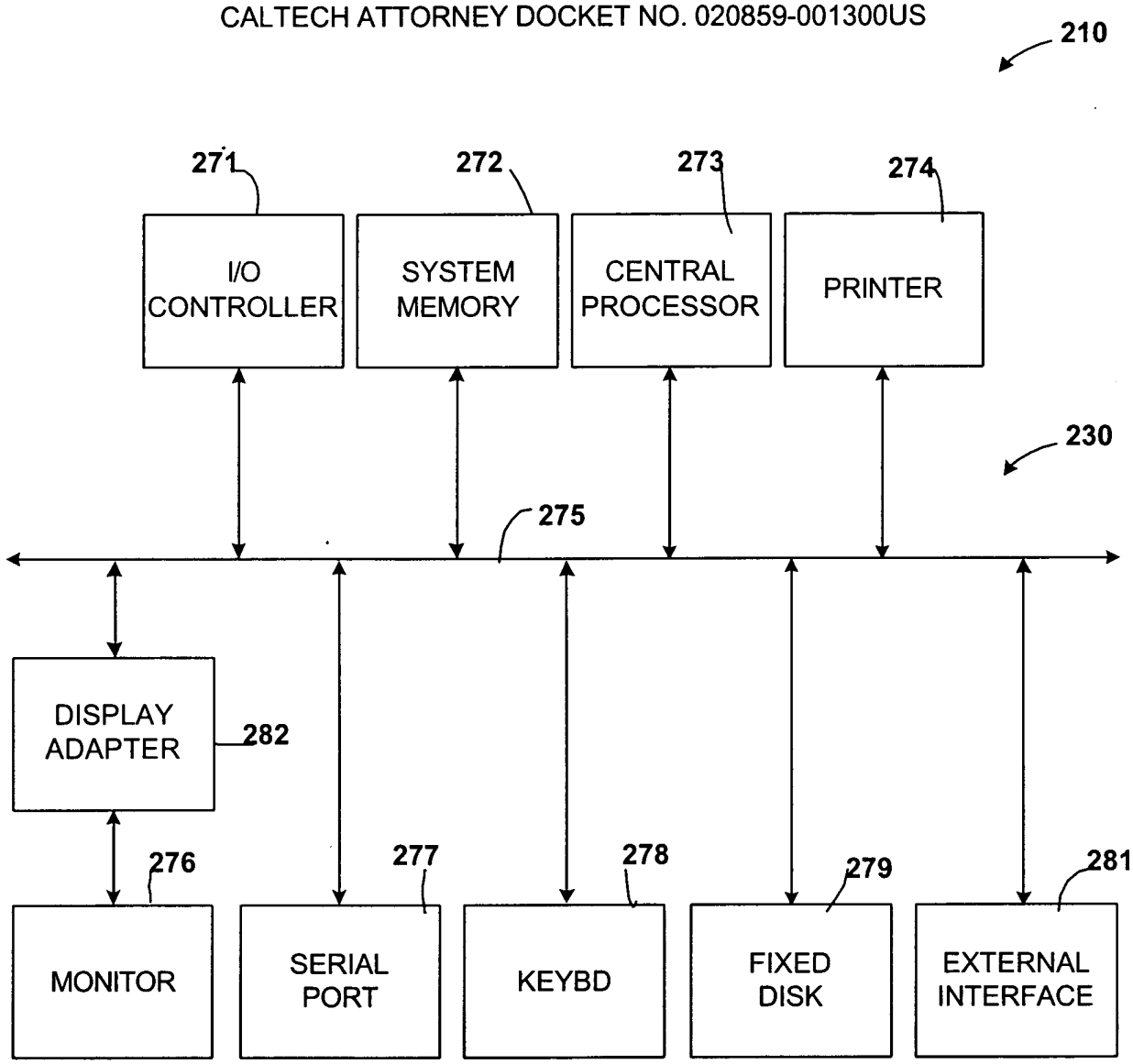

210
271
272
273
274
I/O CONTROLLER
SYSTEM MEMORY
CENTRAL PROCESSOR
PRINTER
230
275
DISPLAY ADAPTER
282
276
277
278
279
281
MONITOR
SERIAL PORT
KEYBD
FIXED DISK
EXTERNAL INTERFACE

FIGURE 2A

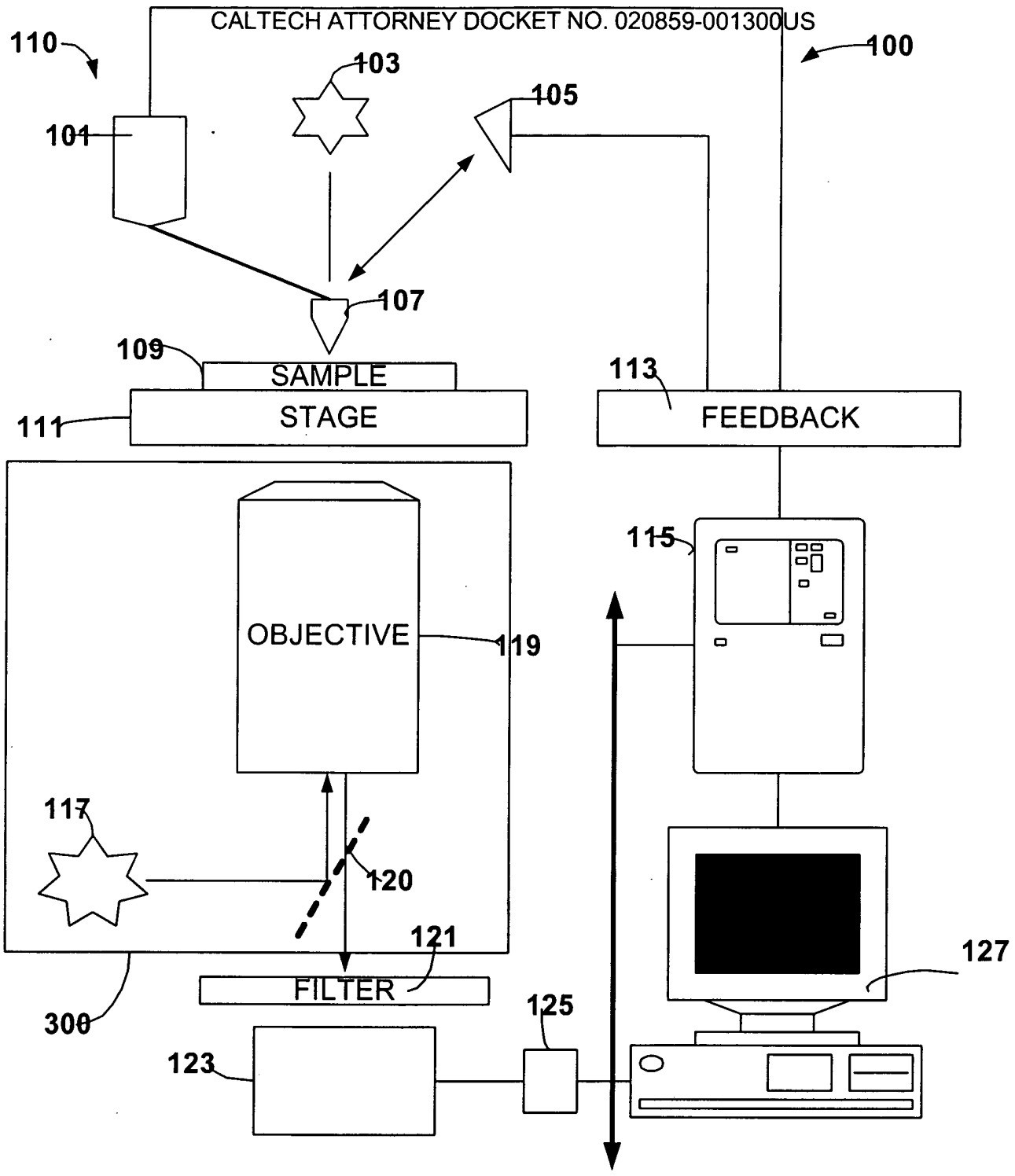

110
100
103
105
101
107
109
SAMPLE
113
111
STAGE
FEEDBACK
115
OBJECTIVE
119
117
120
121
127
FILTER
125
300
123

FIGURE 3

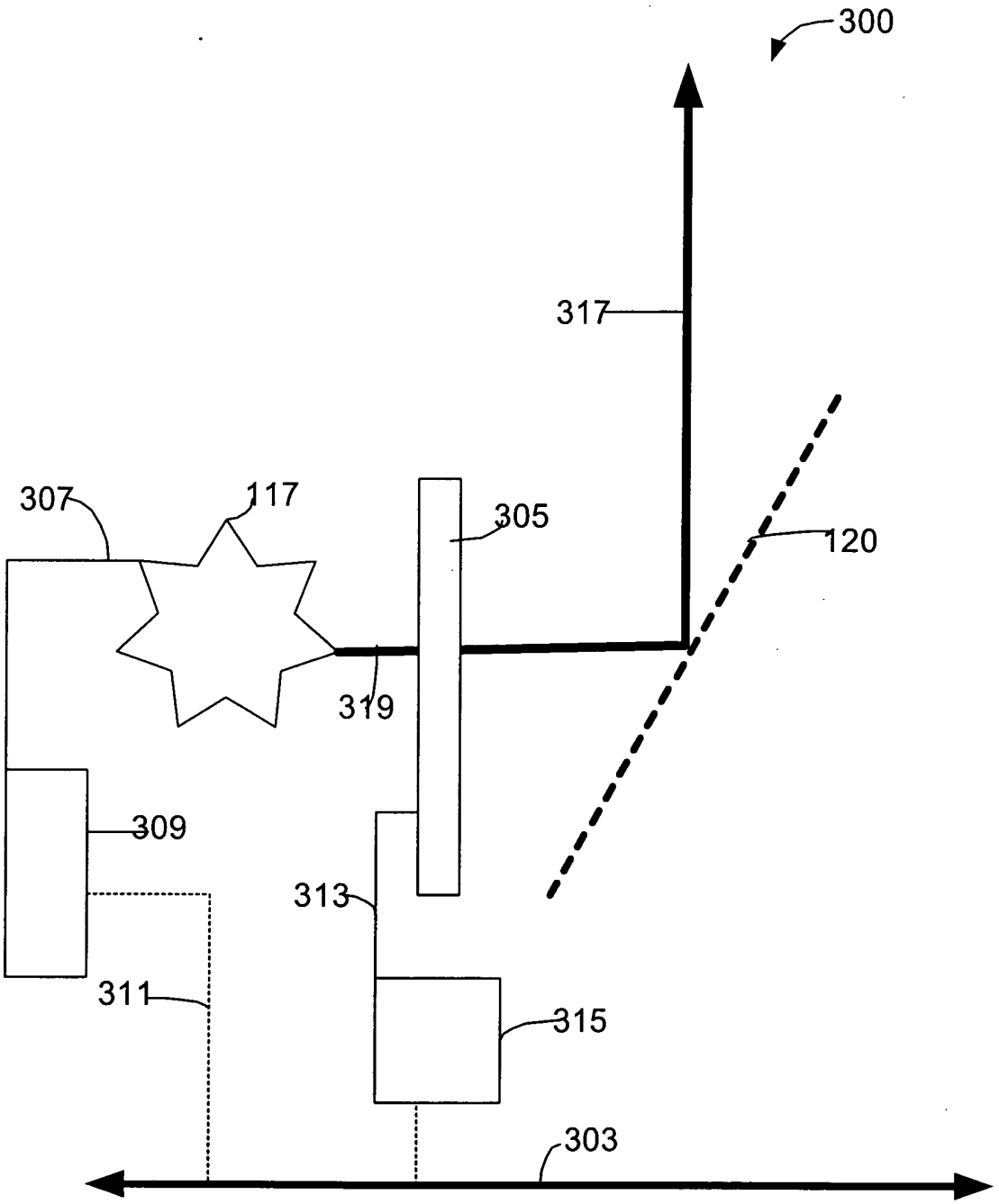


FIGURE 3A

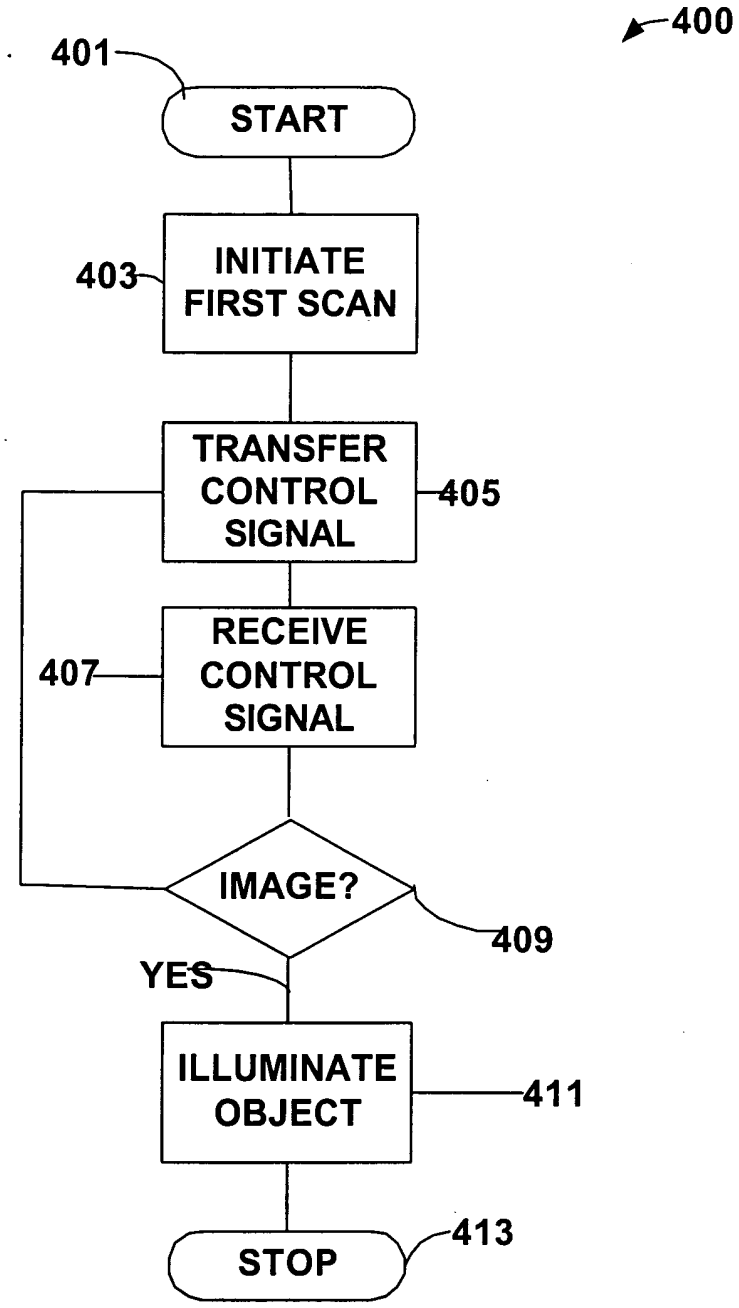

400
401
START
403
INITIATE FIRST SCAN
TRANSFER CONTROL SIGNAL
405
RECEIVE CONTROL SIGNAL
407
IMAGE?
409
YES
ILLUMINATE OBJECT
411
STOP
413

FIGURE 4

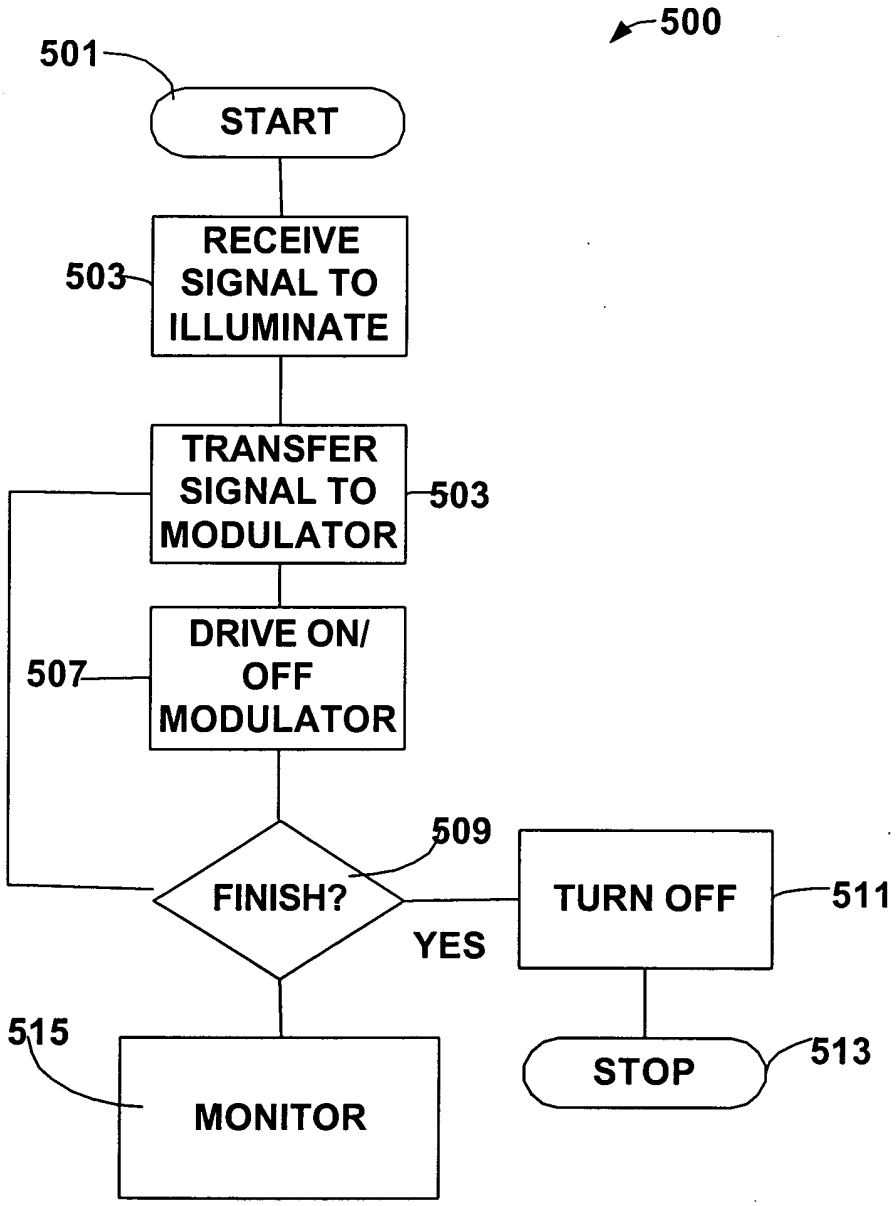
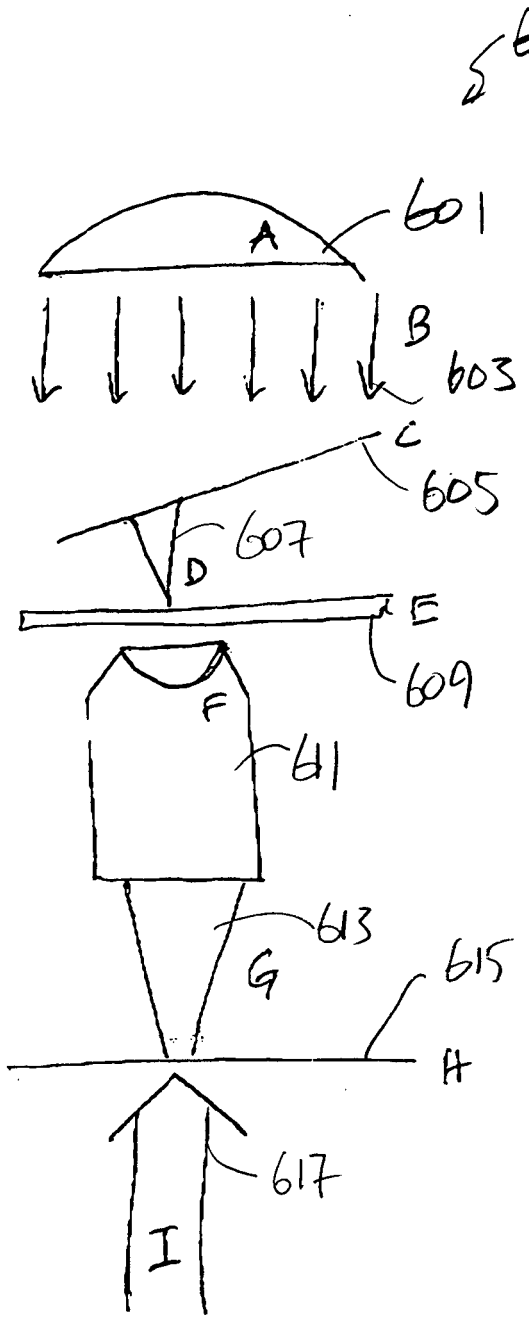

500
501
START
RECEIVE SIGNAL TO ILLUMINATE
503
TRANSFER SIGNAL TO MODULATOR
503
DRIVE ON/ OFF MODULATOR
507
509
FINISH?
YES
TURN OFF
511
STOP
513
515
MONITOR

FIGURE 5


600
601
A
B
603
C
605
607
D
E
609
F
611
613
G
615
H
617
I

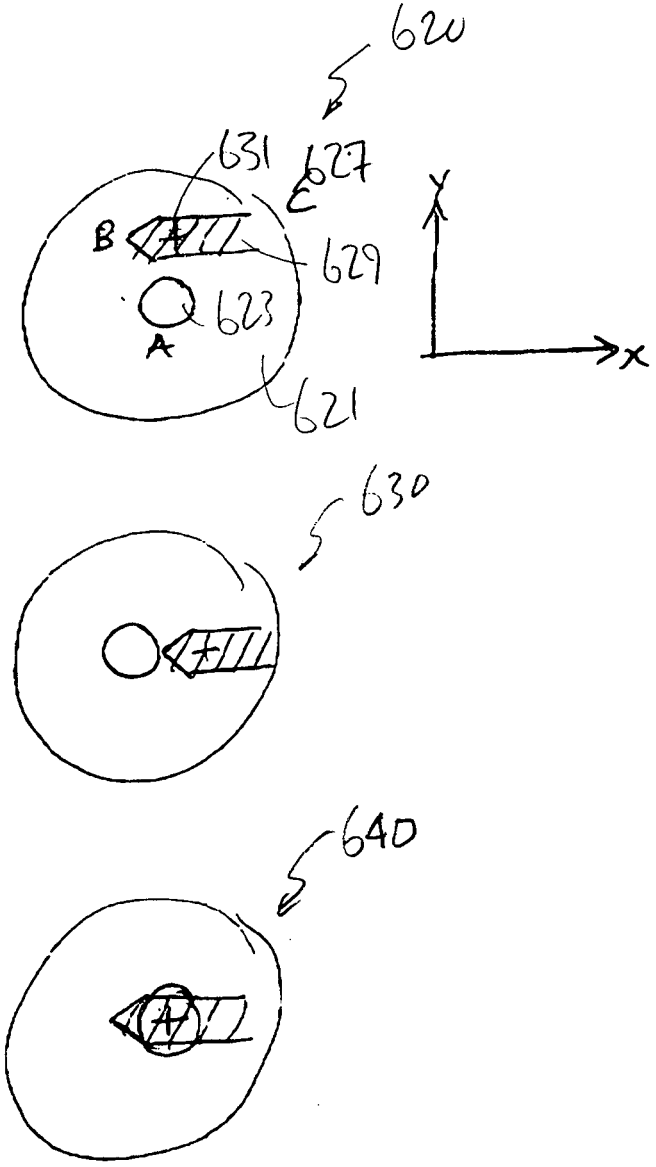

620
631
627
C
B
629
623
A
621
Y
X
630
640

FIG. 6

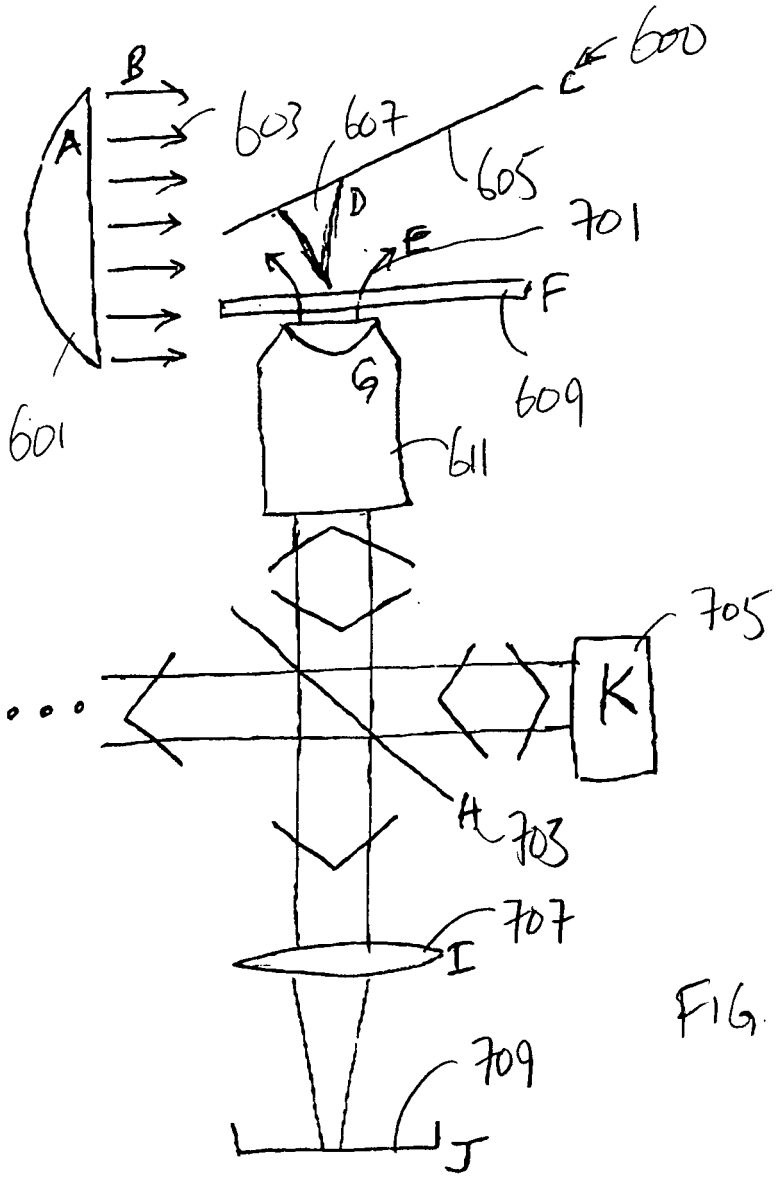
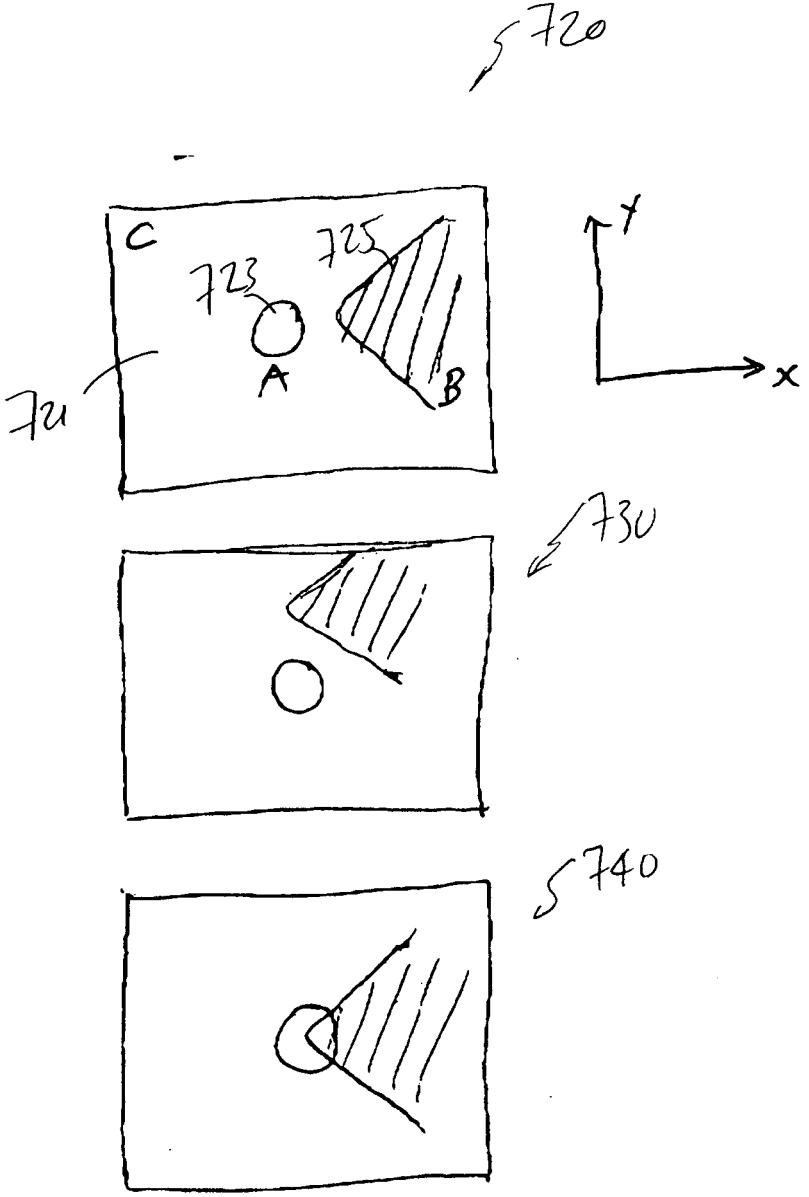

B
A
603
607
C
600
605
D
E
701
F
609
G
601
611
705
K
H
703
707
I
709
J

FIG. 7


720
C
723
725
A
B
721
Y
X
730
740

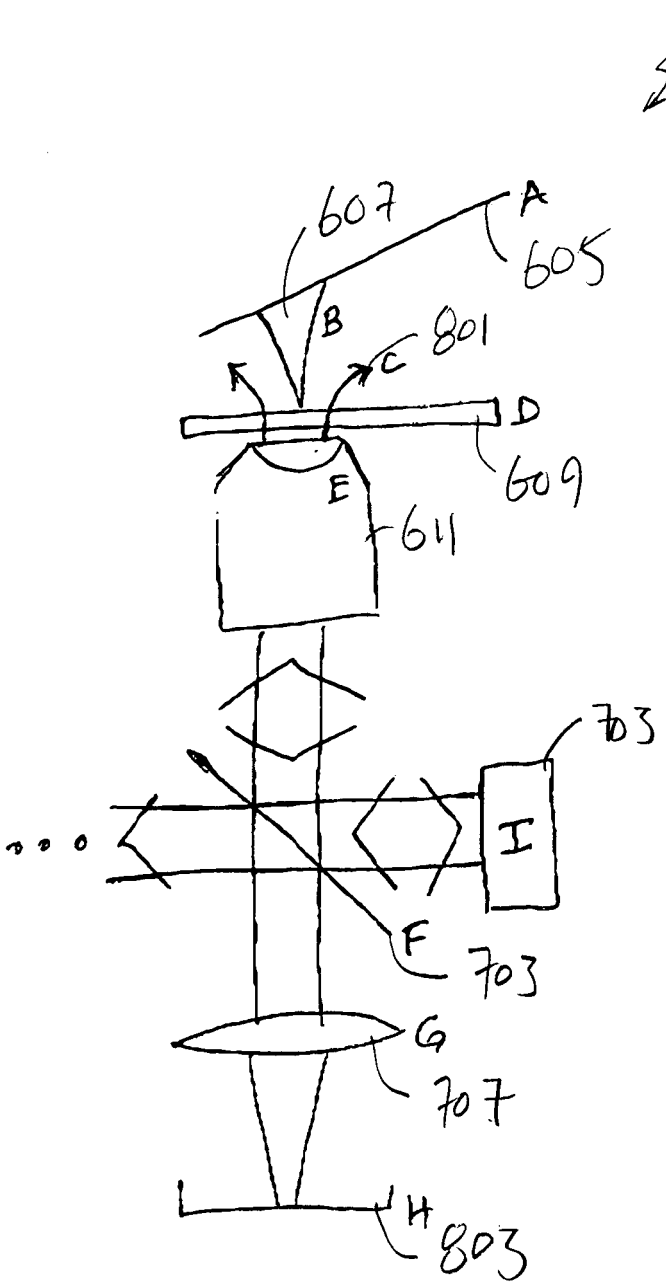
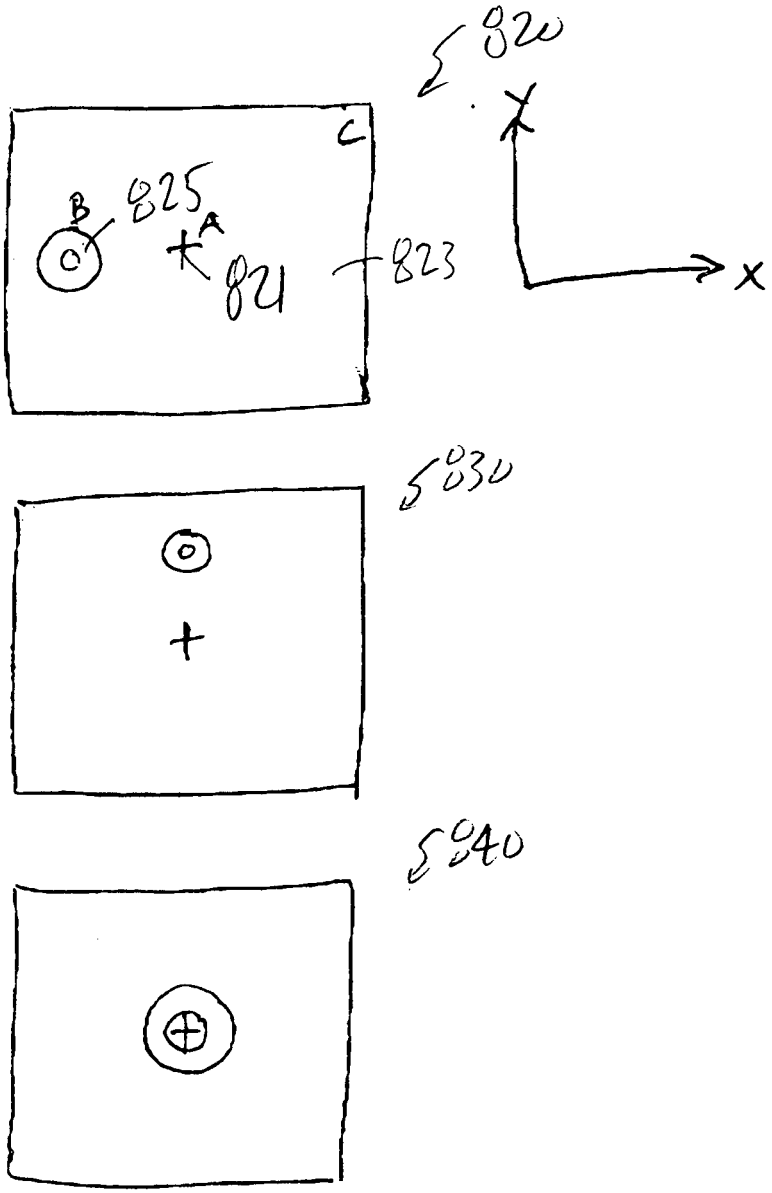

600
607
A
605
B
801
C
F
D
609
E
611
703
I
F
703
G
707
H
803

FIG. 8


820
X
X
C
B
825
A
821
823
830
840

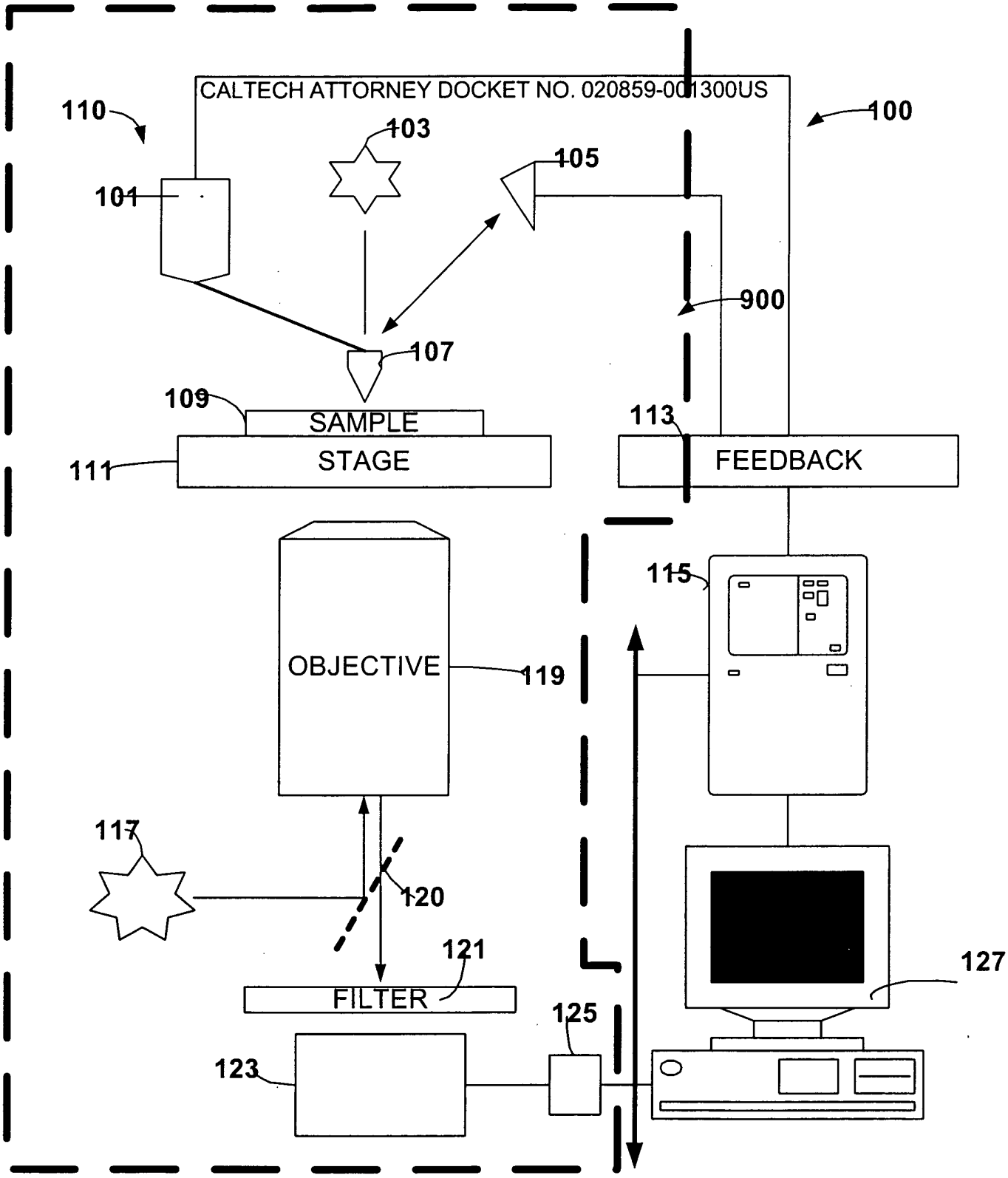

CALTECH ATTORNEY DOCKET NO. 020859-001300US
110
100
103
105
101
900
107
109
SAMPLE
113
STAGE
FEEDBACK
111
115
OBJECTIVE
119
117
120
121
127
FILTER
125
123

FIGURE 9

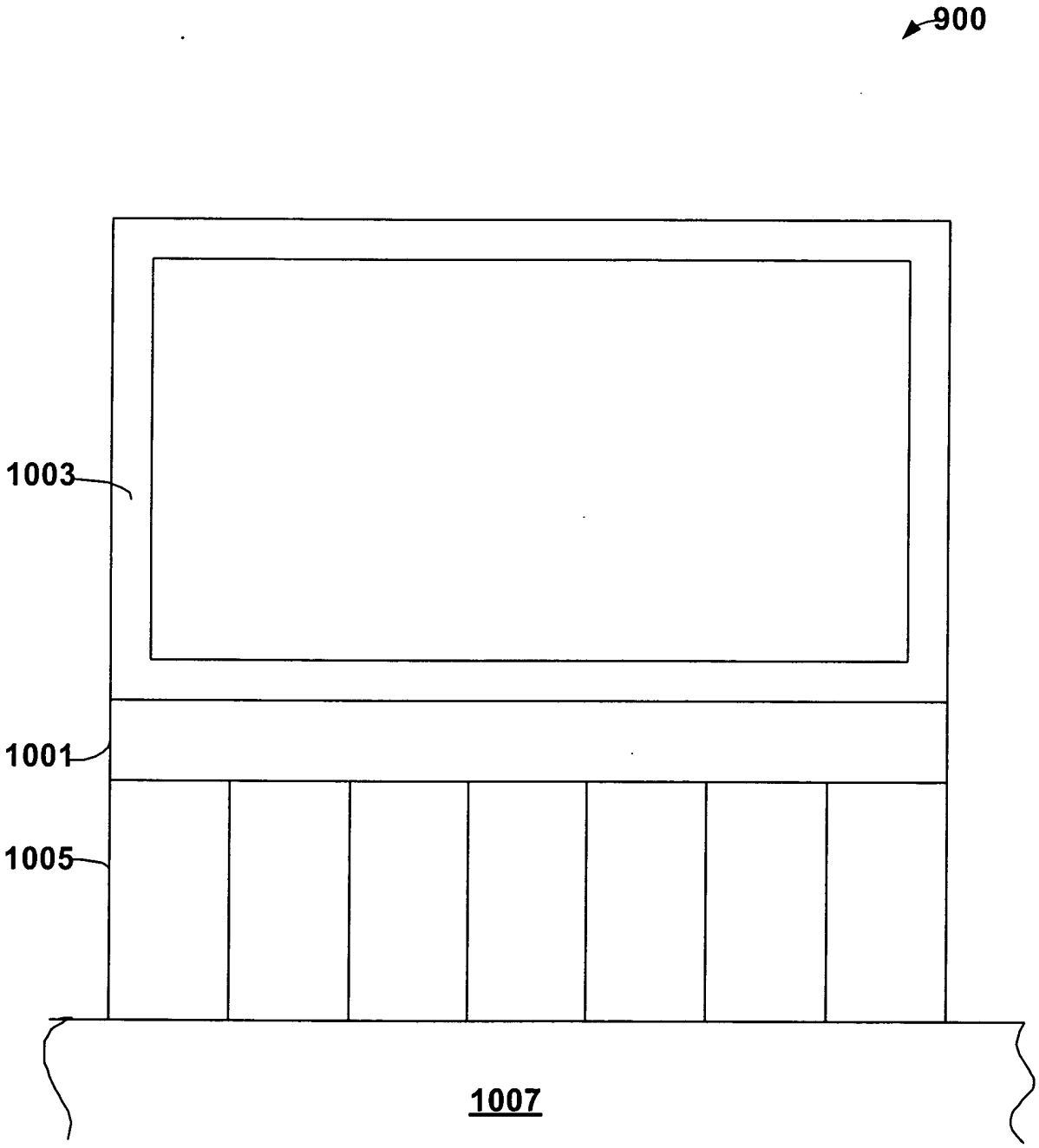


FIGURE 10

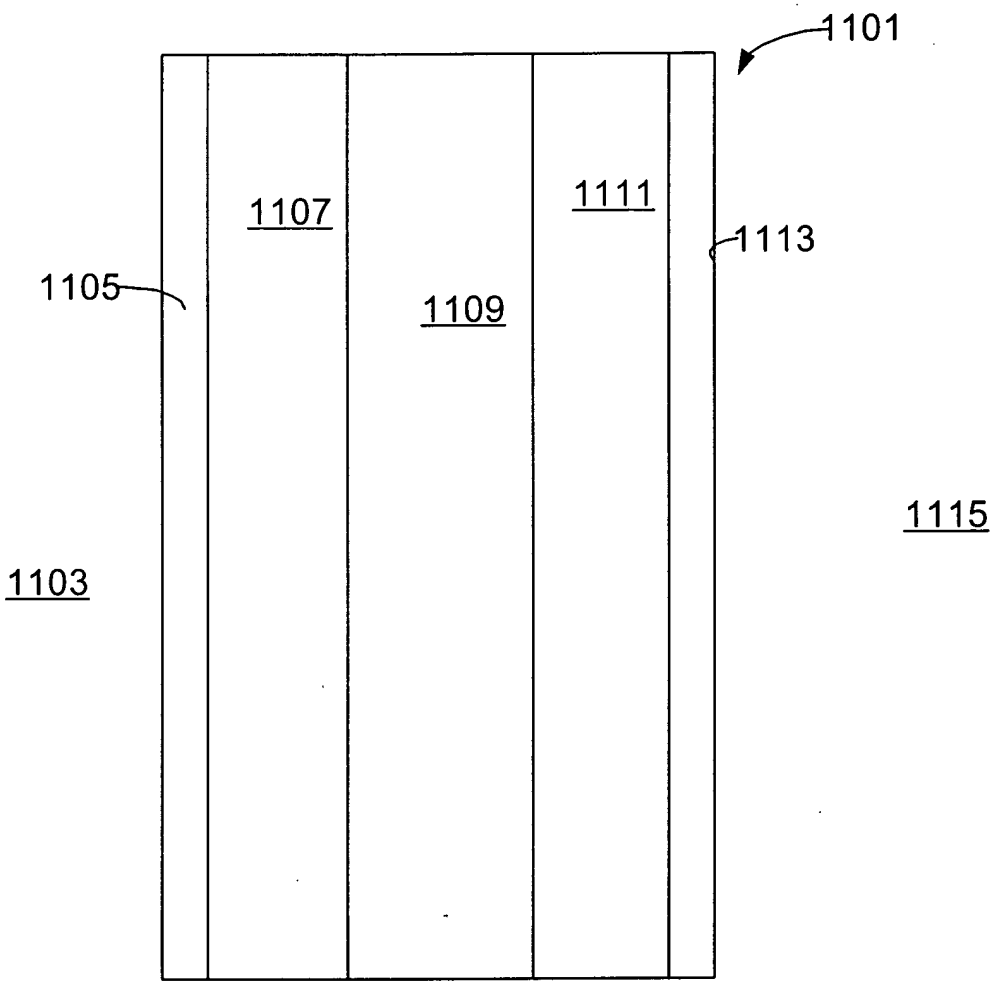


FIGURE 11

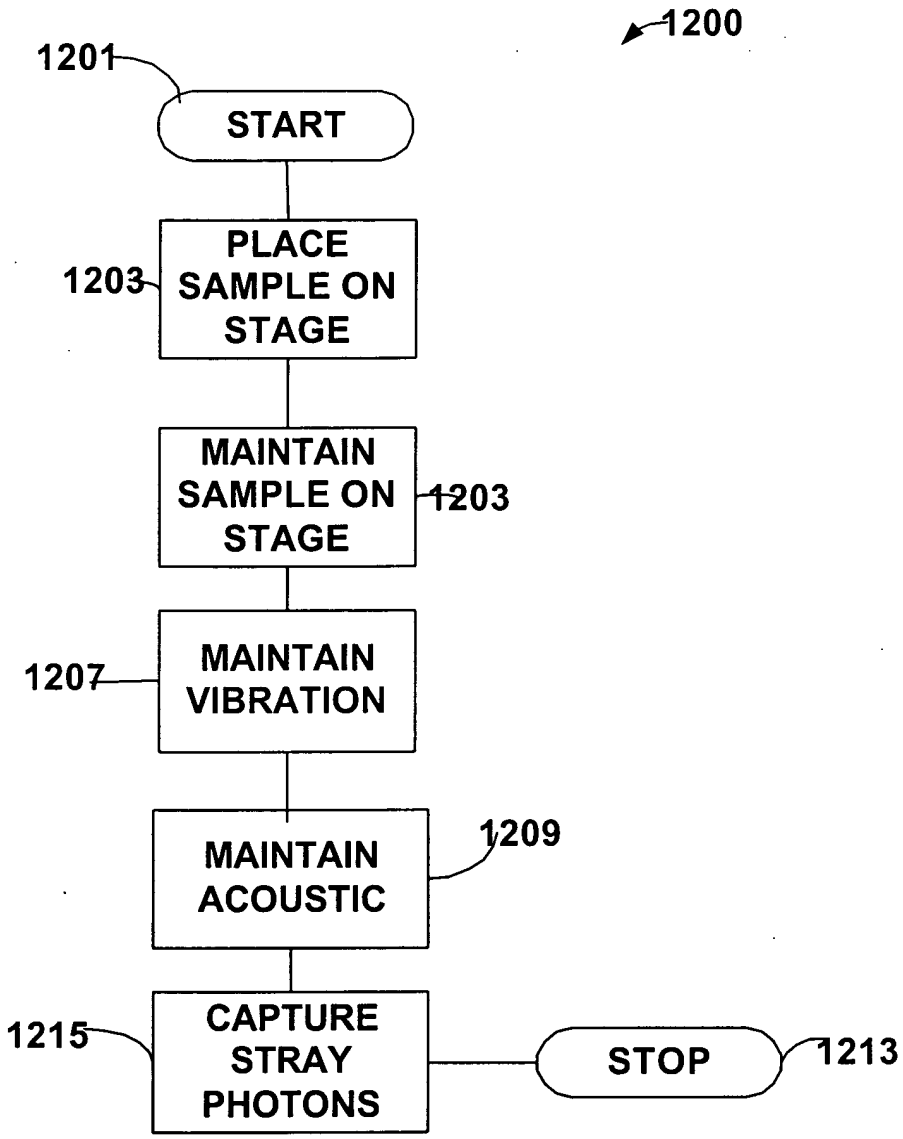

1200
1201
START
PLACE SAMPLE ON STAGE
1203
MAINTAIN SAMPLE ON STAGE
1203
MAINTAIN VIBRATION
1207
MAINTAIN ACOUSTIC
1209
CAPTURE STRAY PHOTONS
1215
STOP
1213

FIGURE 12

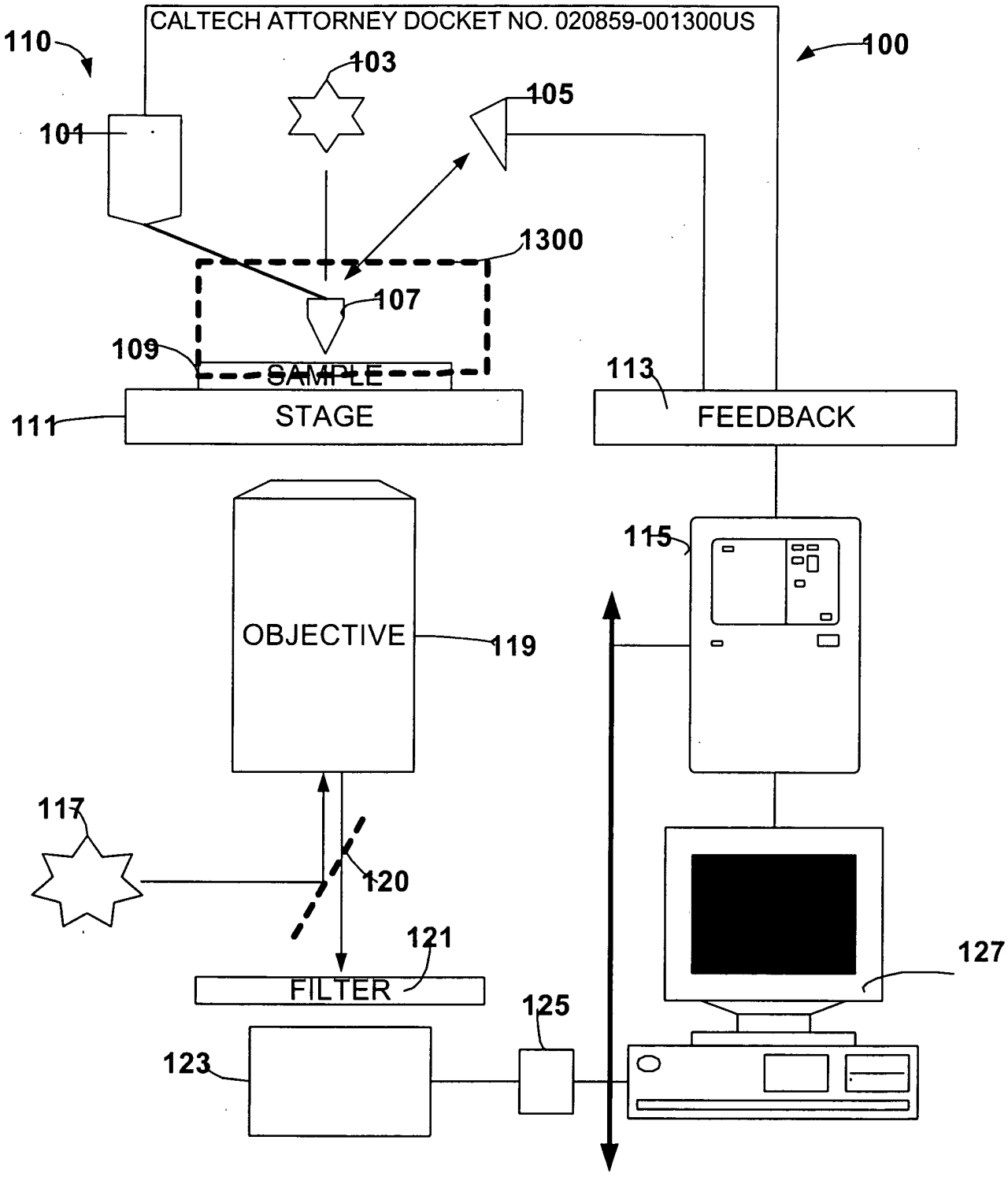

110
100
103
105
101
1300
107
109
SAMPLE
113
111
STAGE
FEEDBACK
115
OBJECTIVE
119
117
120
121
127
FILTER
125
123

FIGURE 13

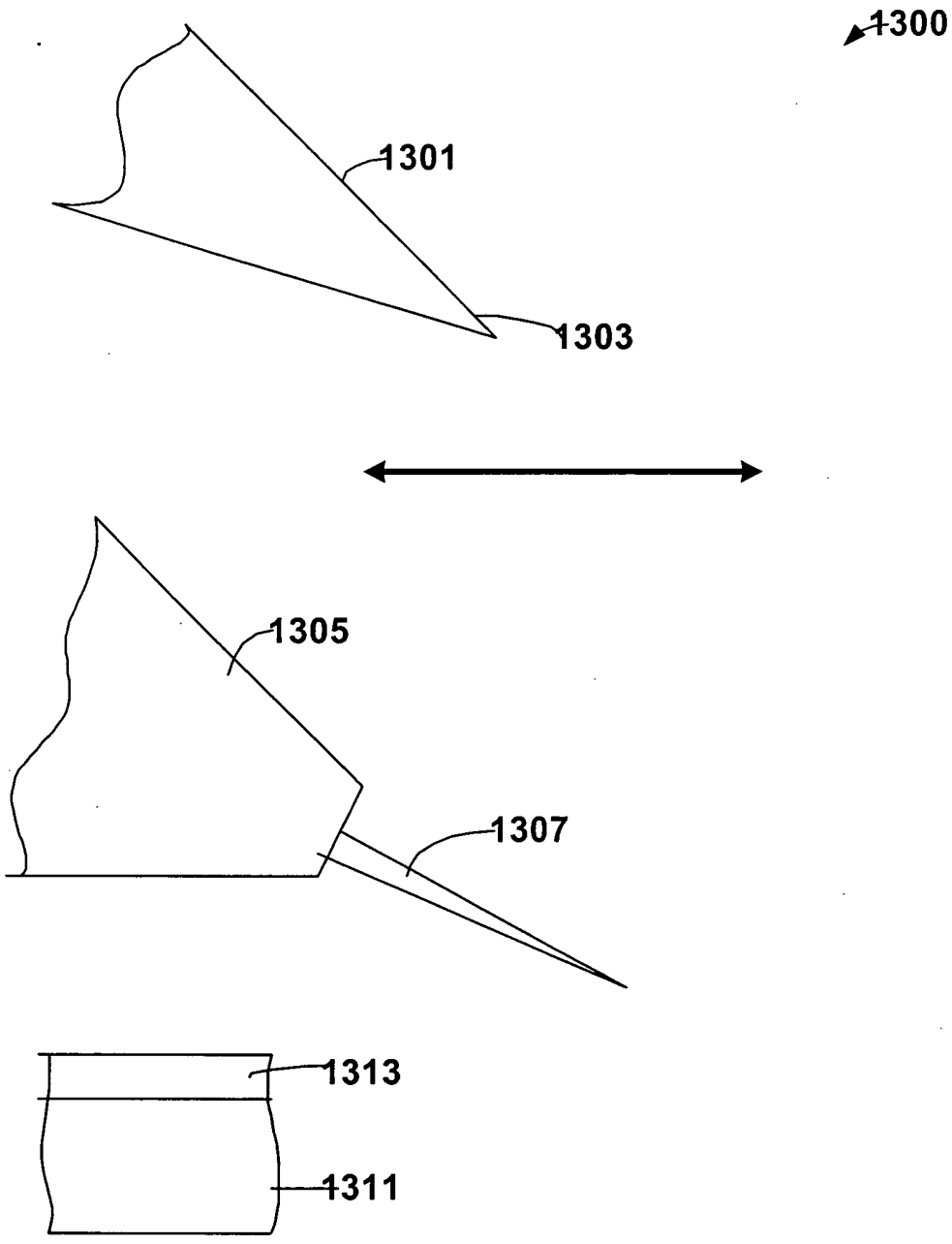


FIGURE 14

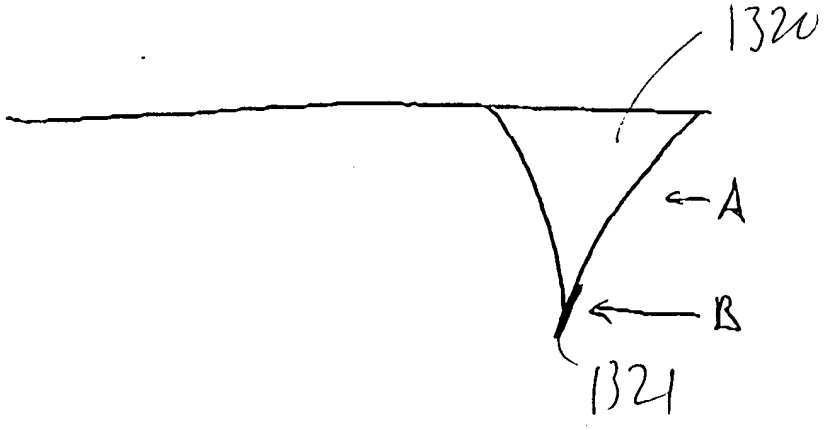


FIG. 14A

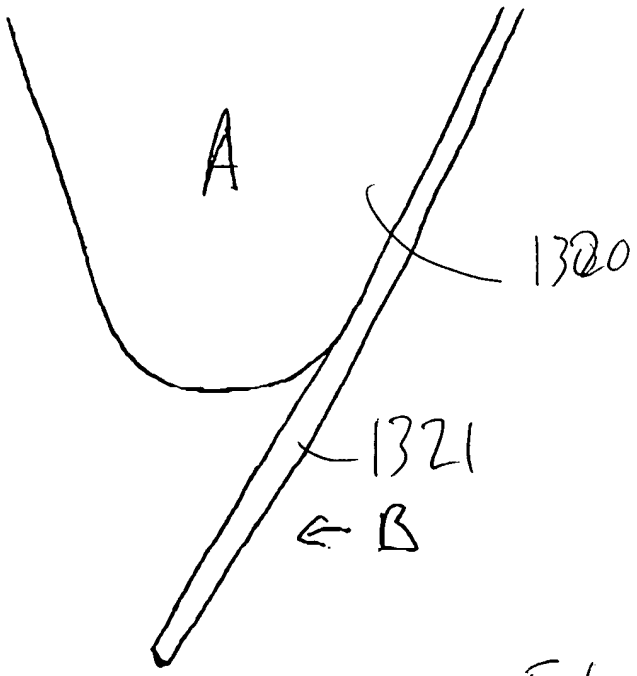


FIG. 14B

Figure 14C

Figure 14D

Figure 14E

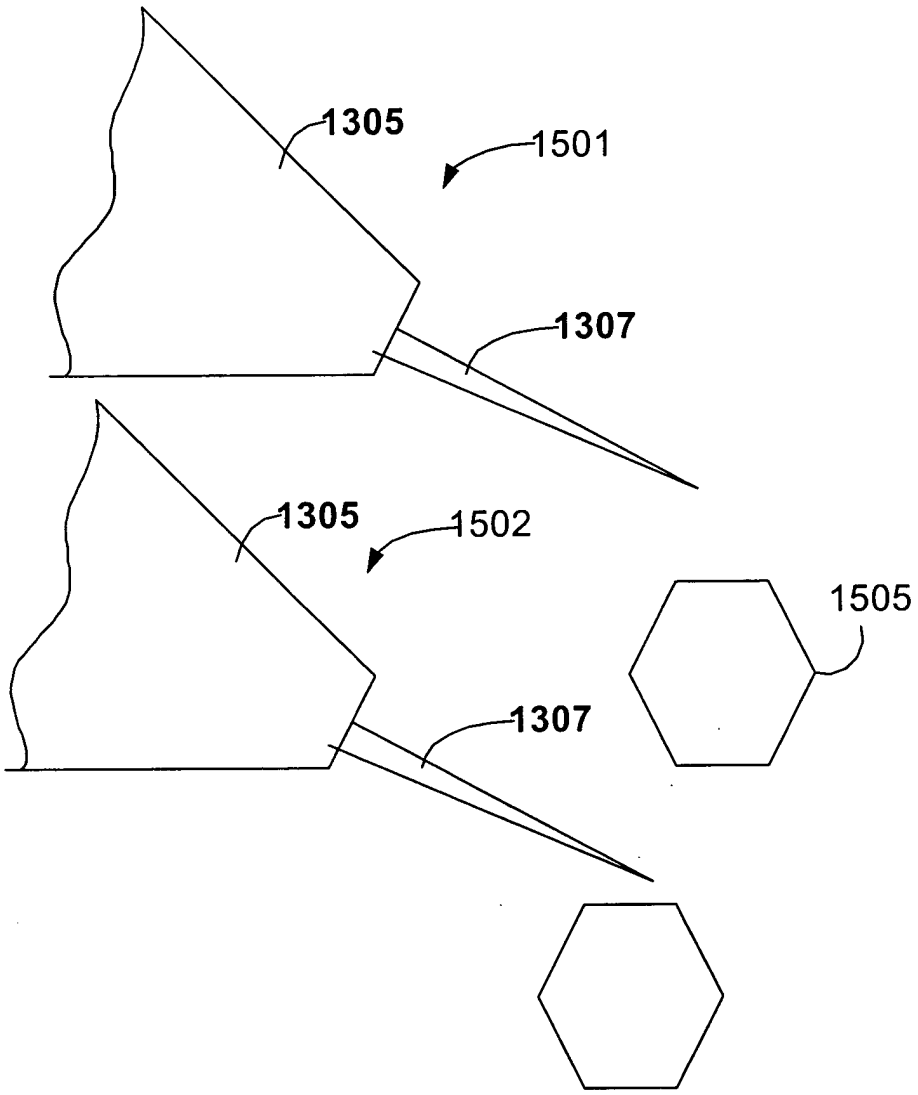


FIGURE 15

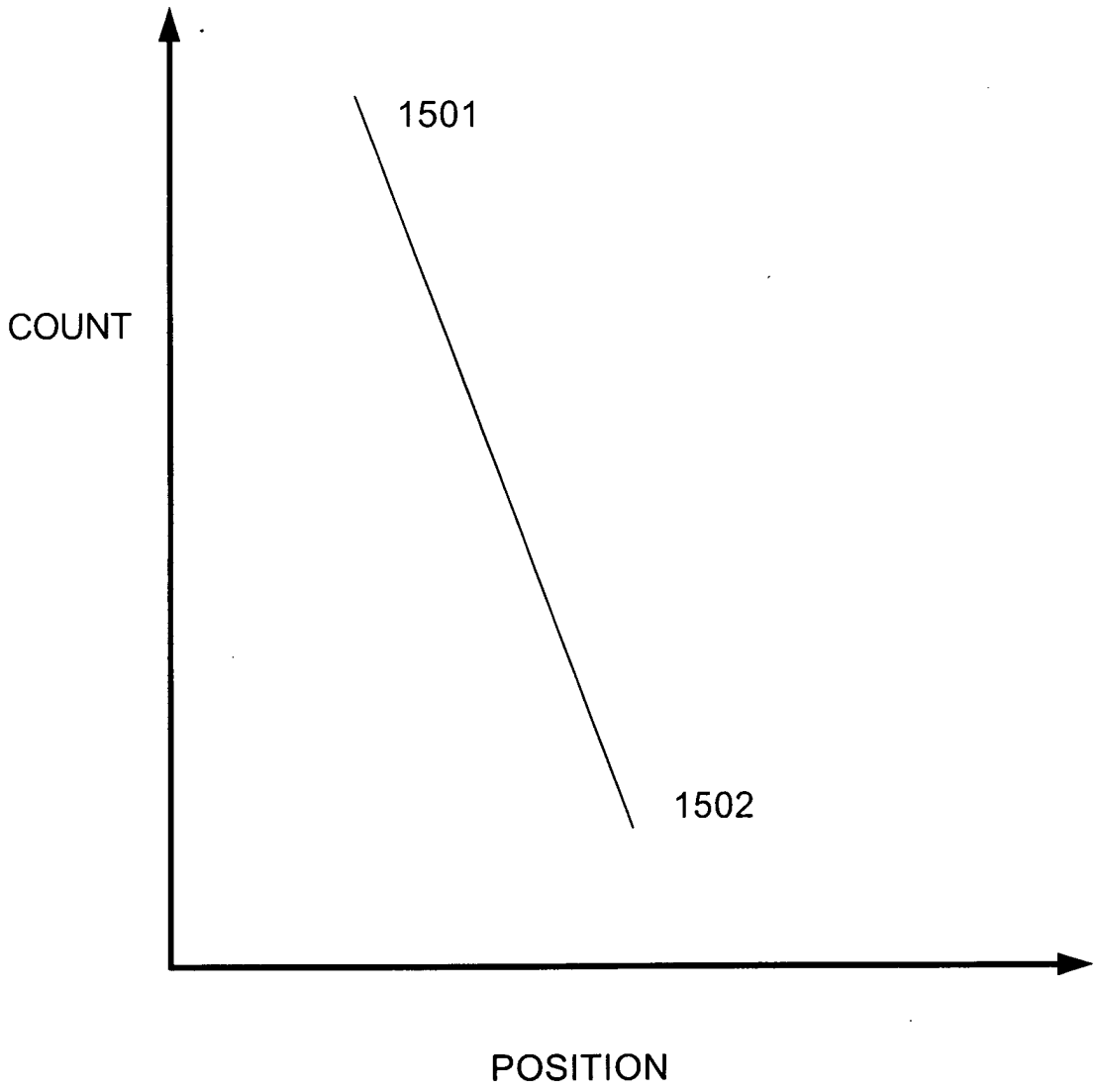


FIGURE 16

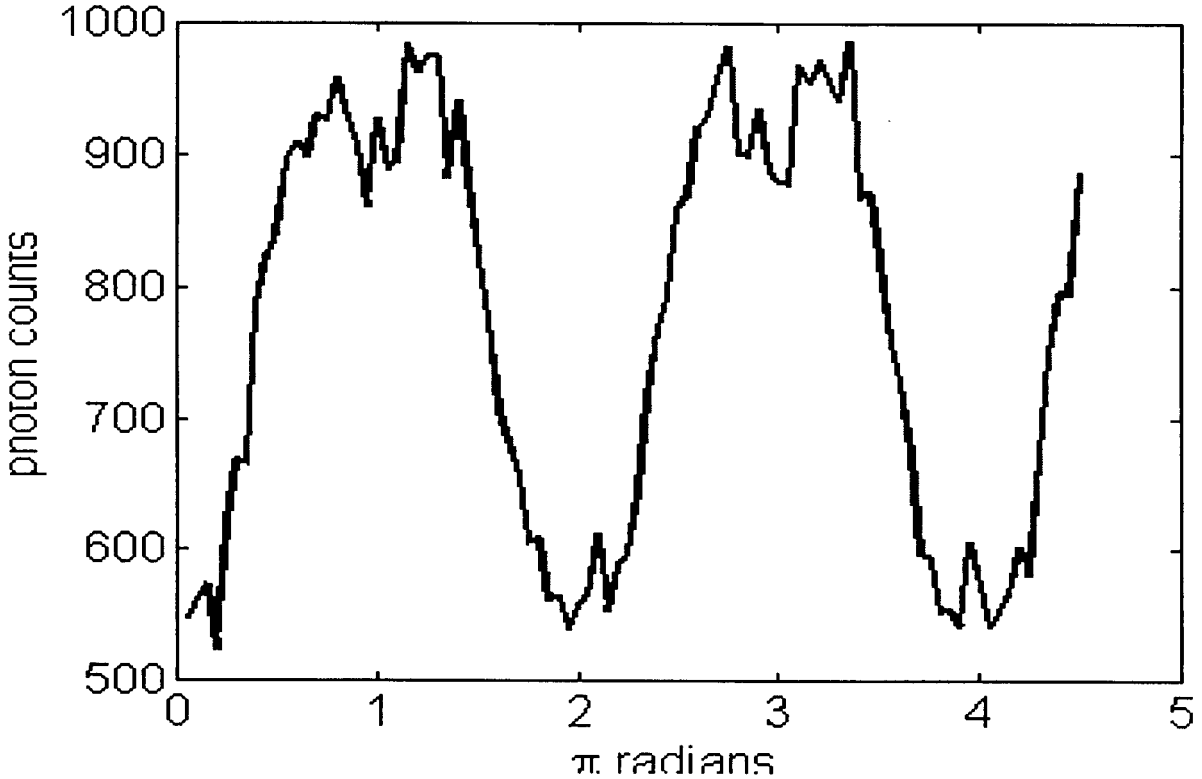


Figure 17

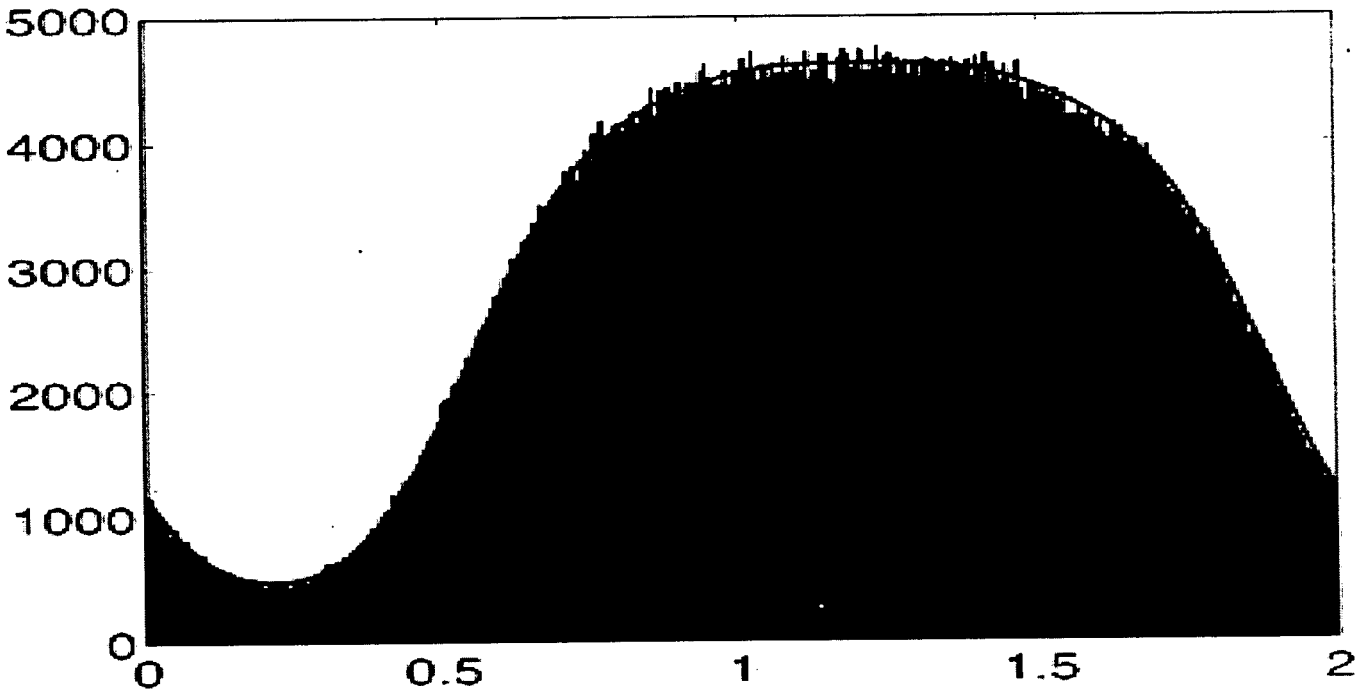


Figure 18

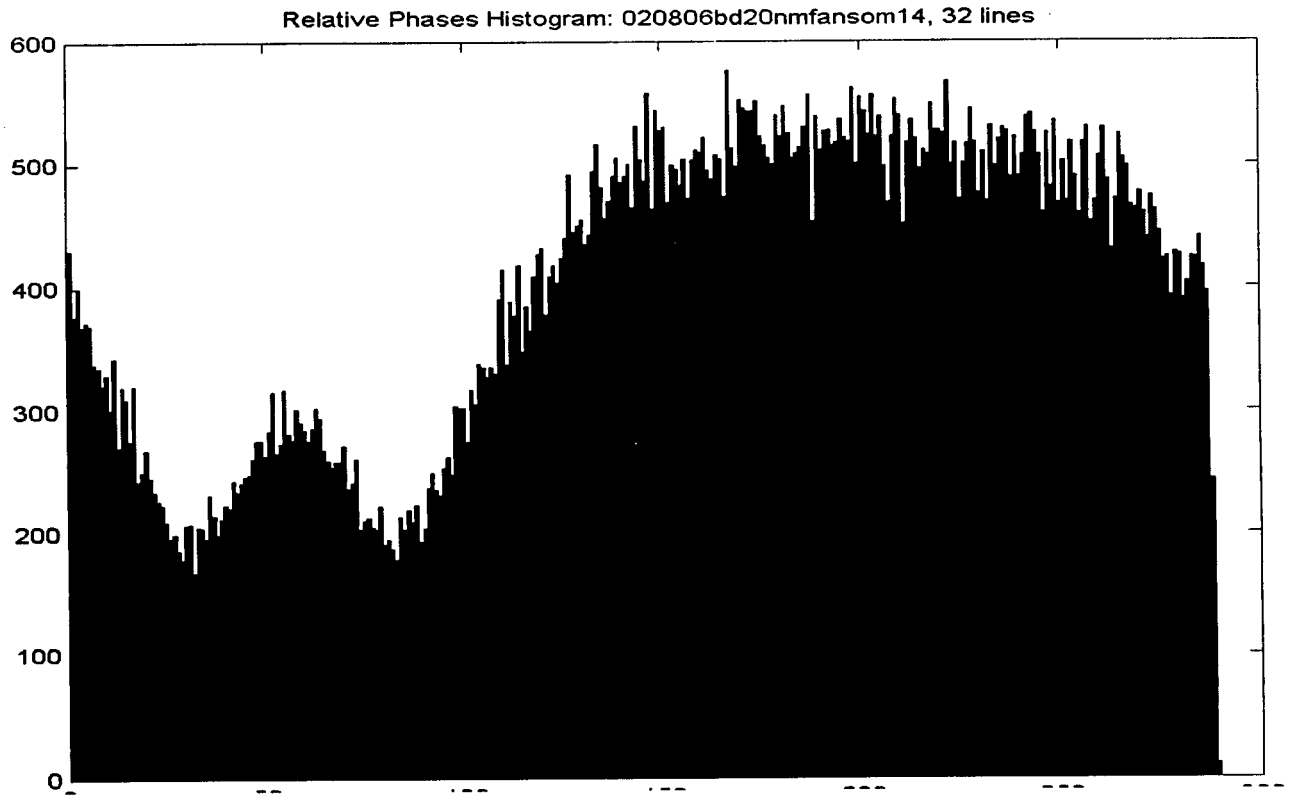

Relative Phases Histogram: 020806bd20nmfansom14, 32 lines
600
500
400
300
200
100
0

Figure 19

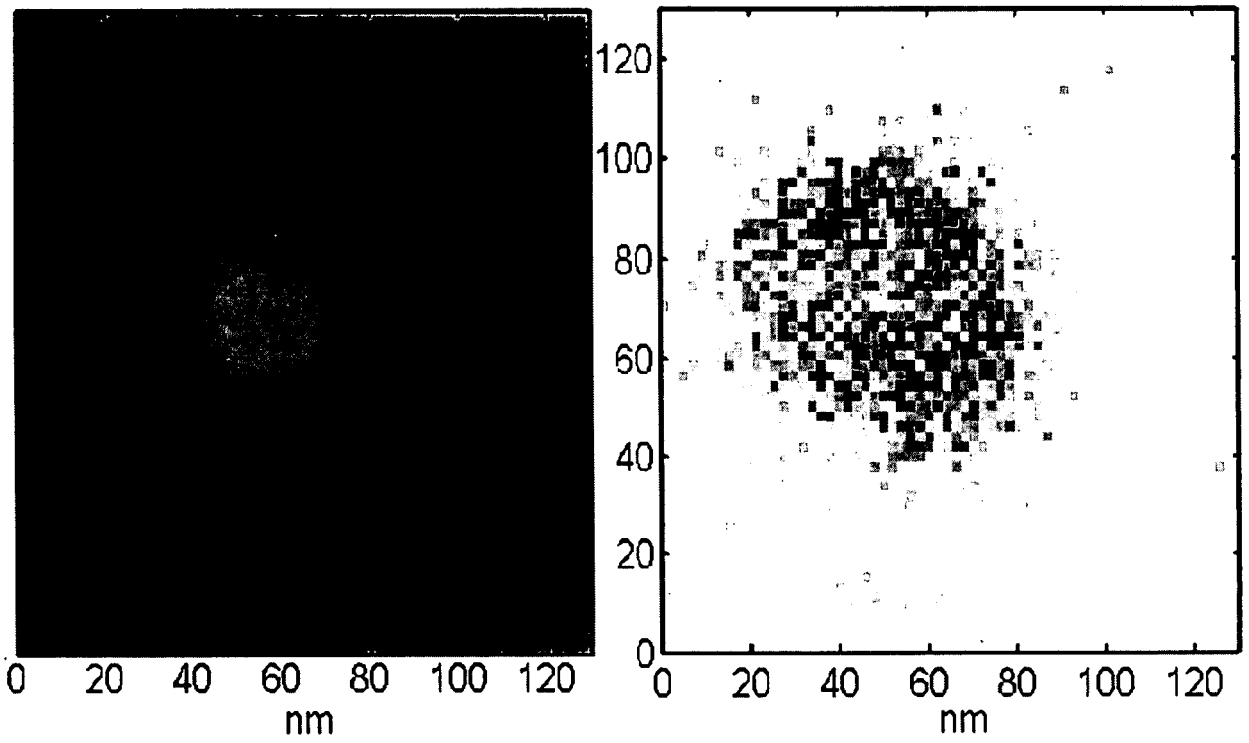


Figure 20

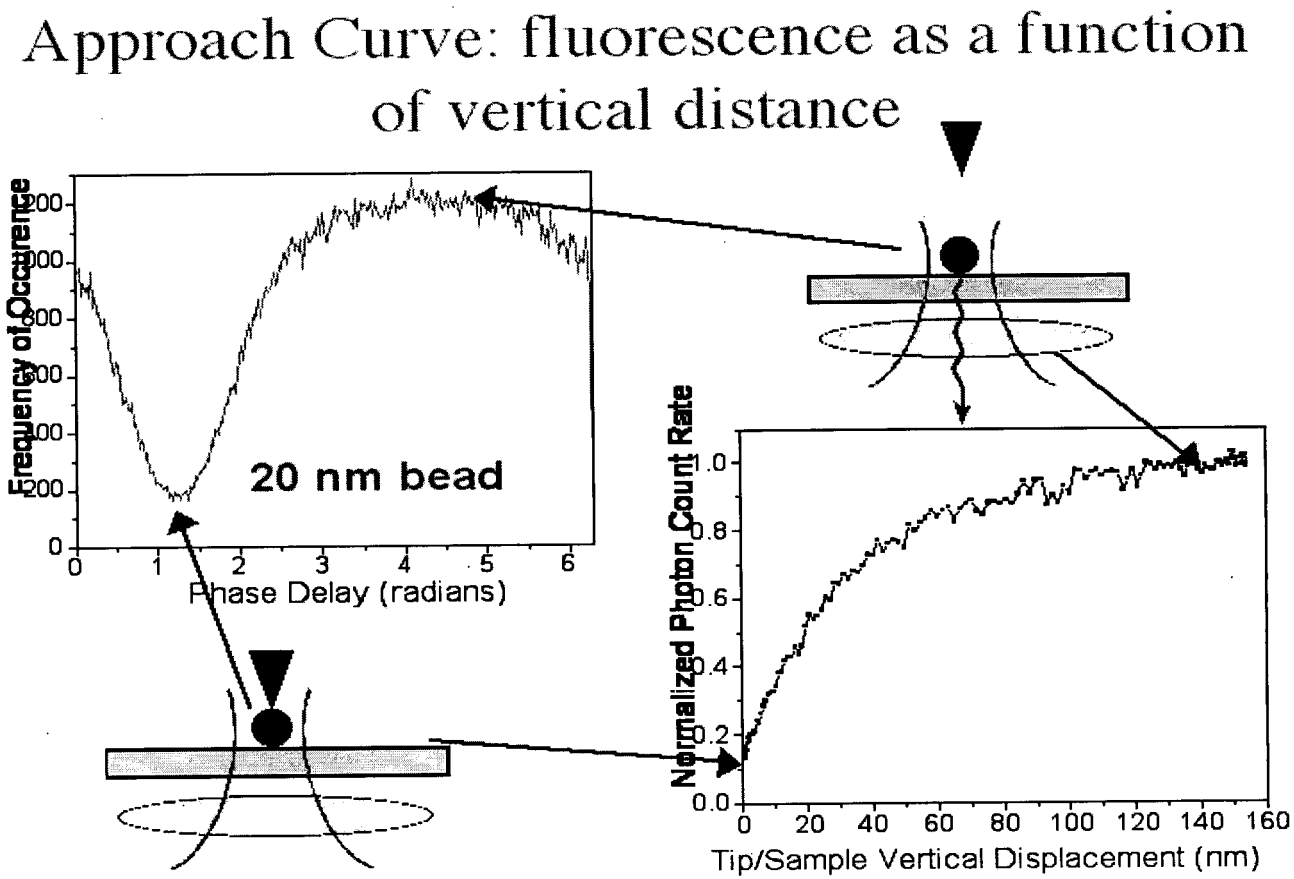
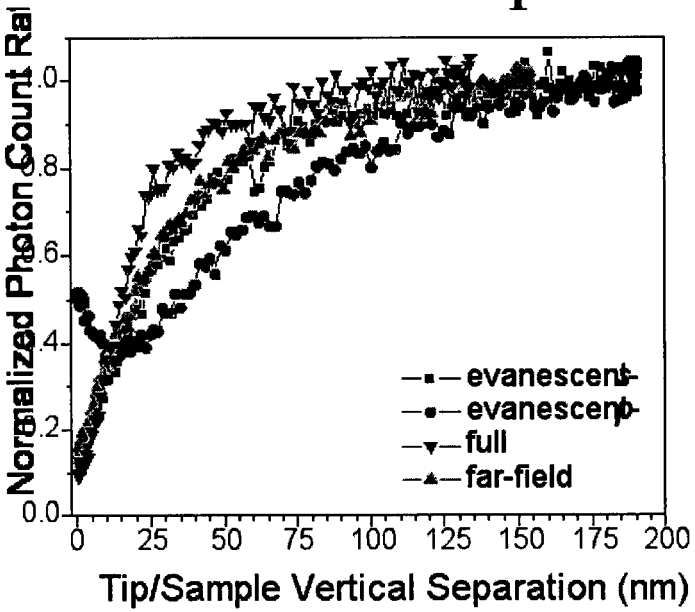

Approach Curve: fluorescence as a function of vertical distance
Frequency of Occurence
0
200
400
600
800
1000
0
1
2
3
4
5
6
Phase Delay (radians)
20 nm bead
Normalized Photon Count Rate
0.0
0.2
0.4
0.6
0.8
1.0
0
20
40
60
80
100
120
140
160
Tip/Sample Vertical Displacement (nm)

Figure 20A

Metallic Tips



- Platinum-iridium coated tips (commercial)
- 85 – 90% suppression of fluorescence
- Partial recovery of fluorescence for *p*-polarization

Figure 20B

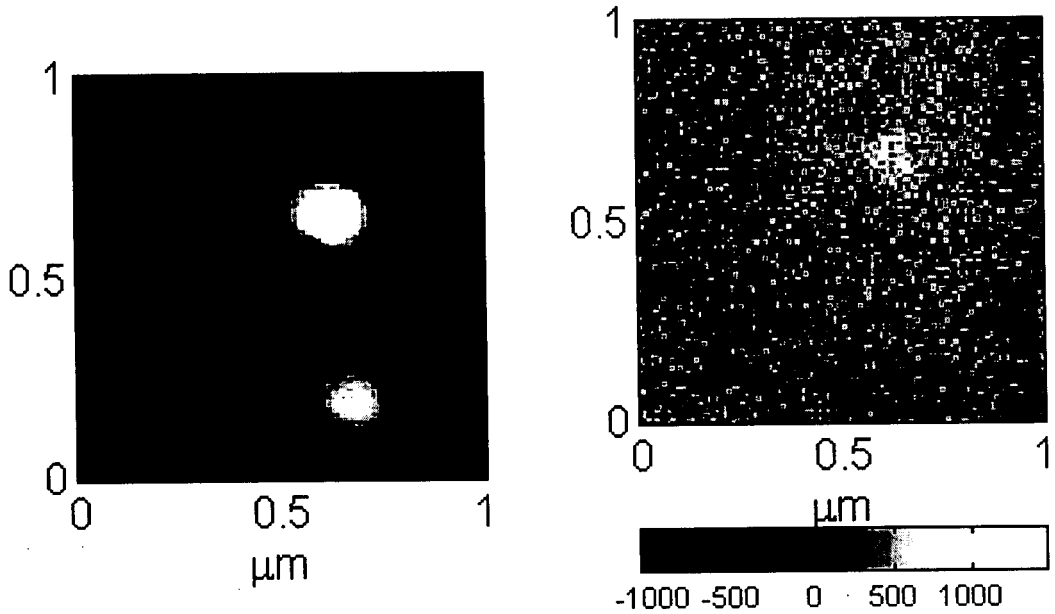


Figure 21

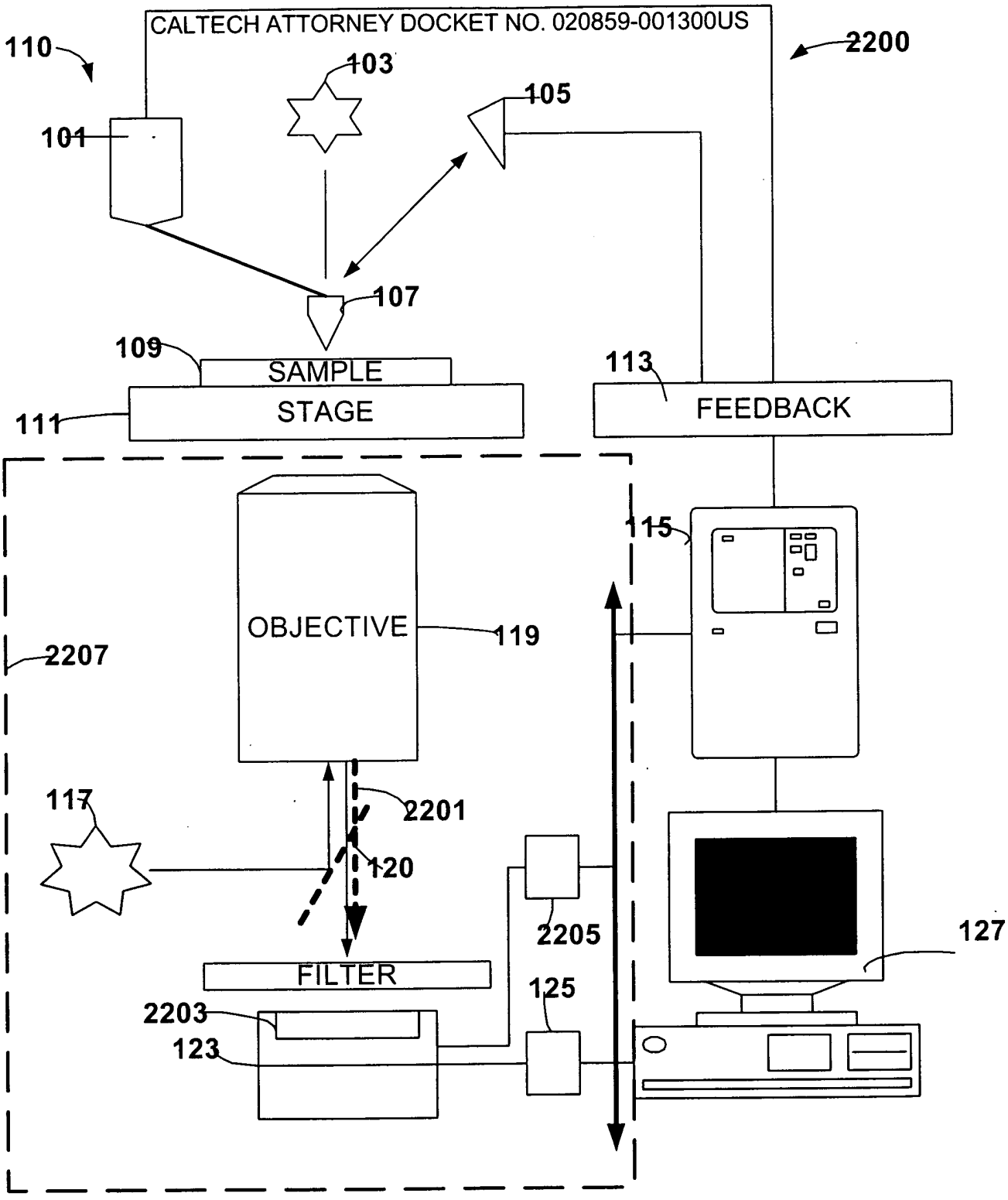

110
2200
103
105
101
107
109
SAMPLE
113
STAGE
FEEDBACK
111
115
OBJECTIVE
119
2207
117
2201
120
2205
127
FILTER
125
2203
123

FIGURE 22

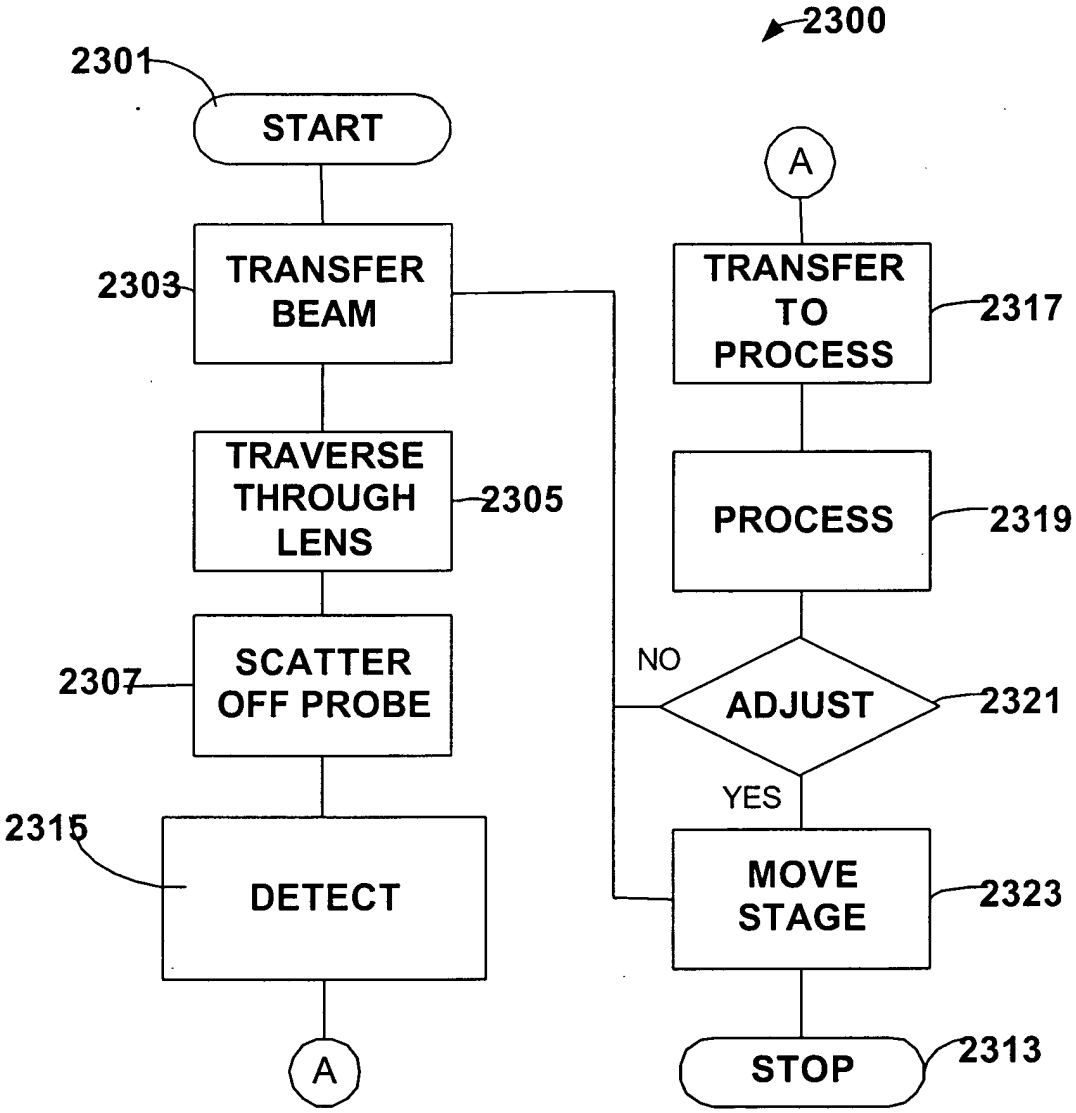

2300
2301
START
2303
TRANSFER BEAM
TRAVERSE THROUGH LENS
2305
2307
SCATTER OFF PROBE
2315
DETECT
A
A
TRANSFER TO PROCESS
2317
PROCESS
2319
NO
ADJUST
2321
YES
MOVE STAGE
2323
STOP
2313

FIGURE 23

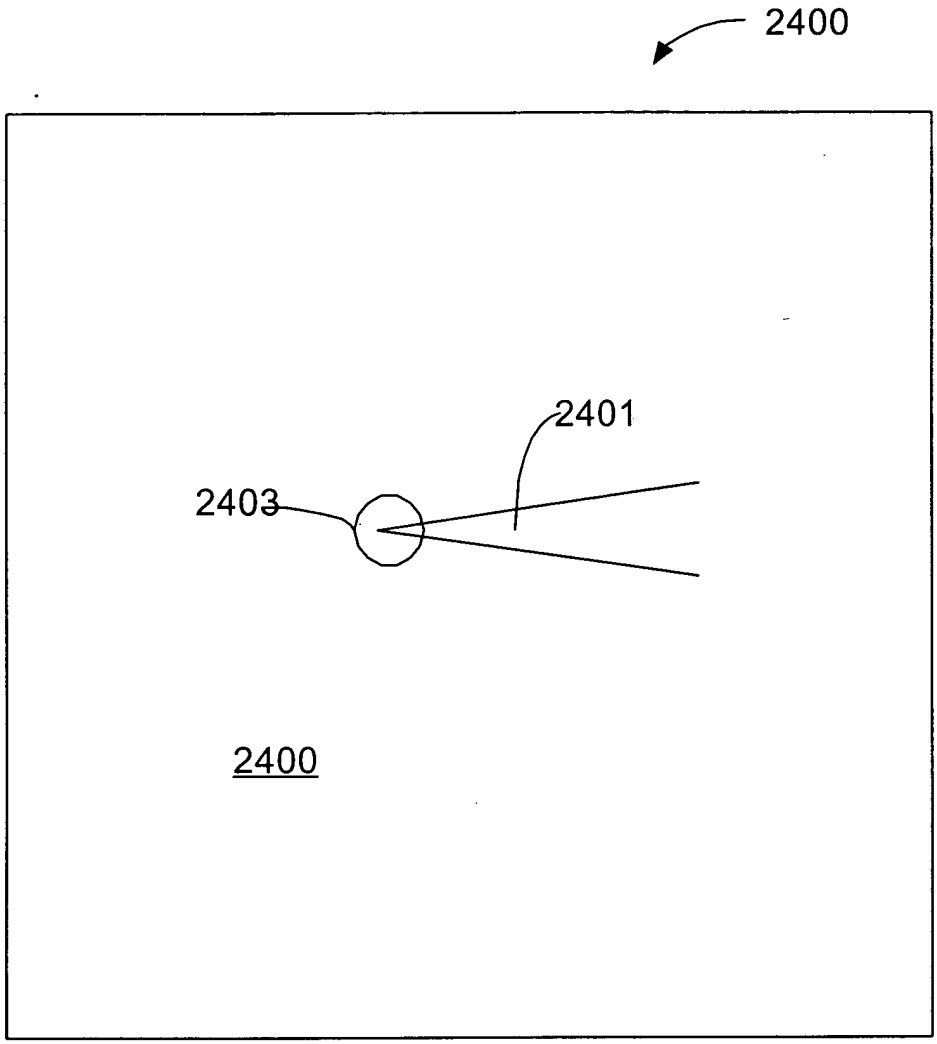


FIGURE 24

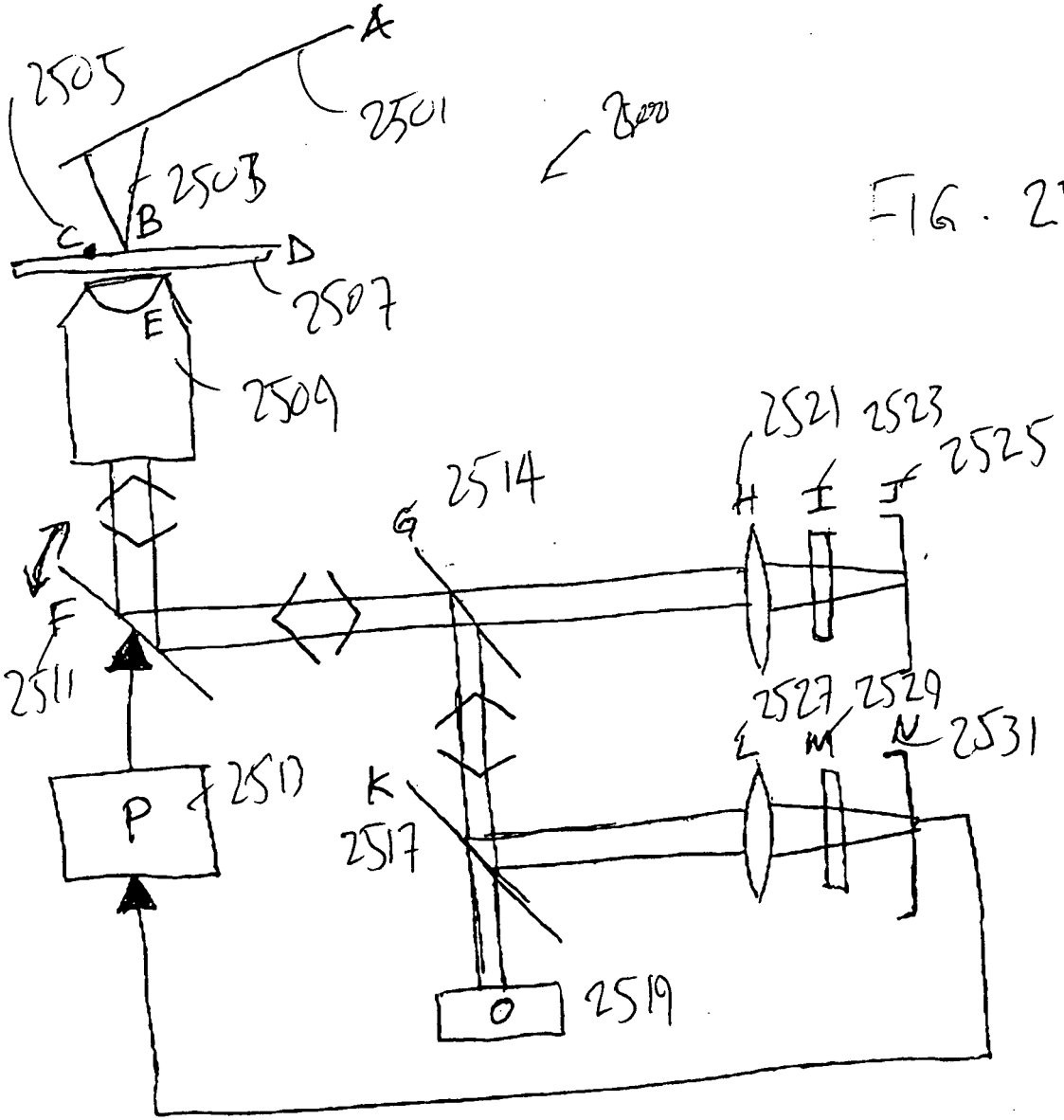

A
2505
2501
2503
B
C
D
2507
E
2509
2521
2523
2525
2514
G
H
I
J
F
2511
2527
2529
2531
L
M
N
K
2517
P
2513
O
2519

FIG. 25

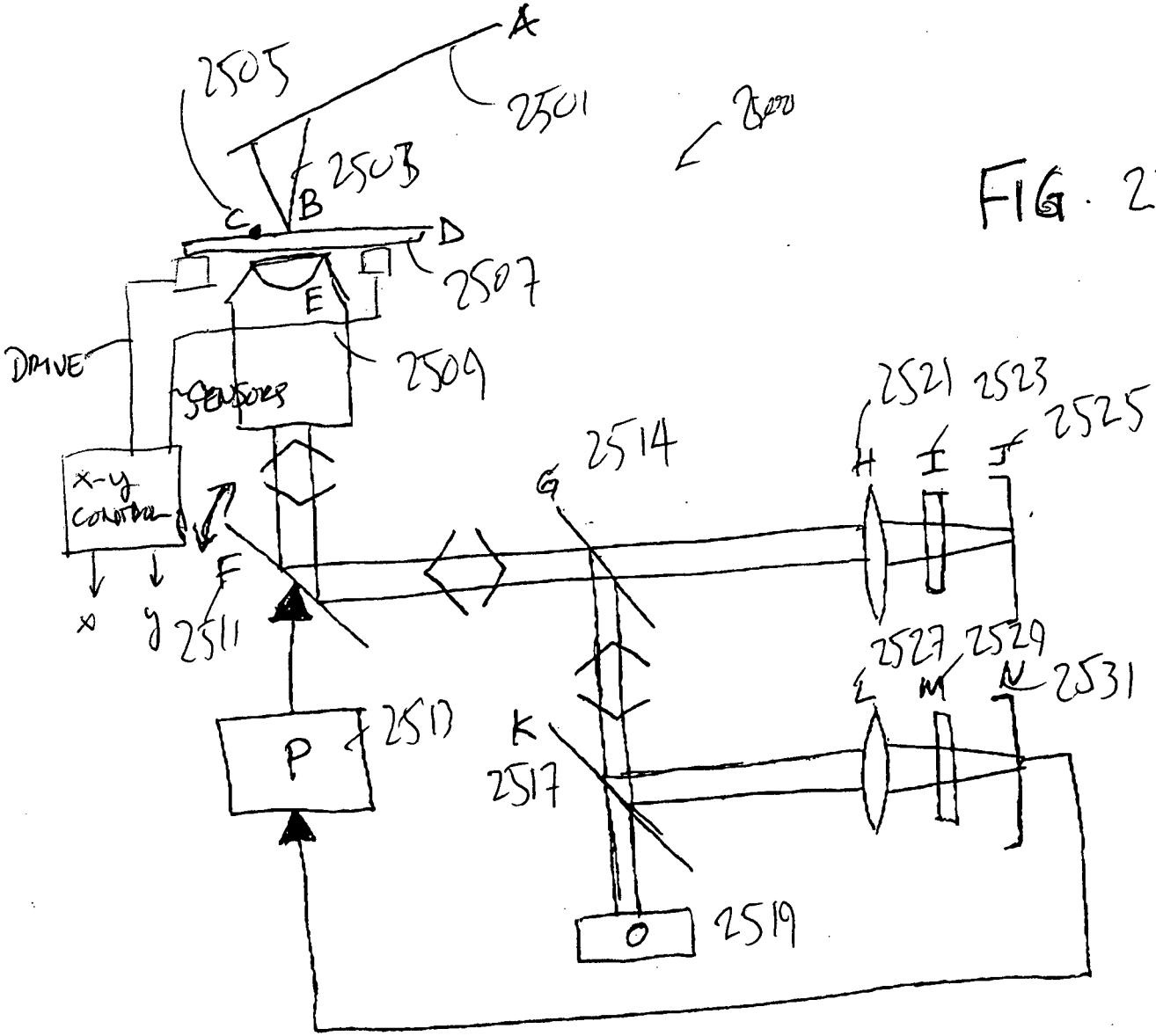

A
2505
2501
2503
B
C
D
2507
E
DRIVE
SENSORS
2509
x-y CONTROL
x
y
F
2511
2514
G
2521
2523
2525
H
I
J
2527
2529
2531
L
M
N
P
2513
K
2517
O
2519

FIG. 25A

FILTER PLACEMENT

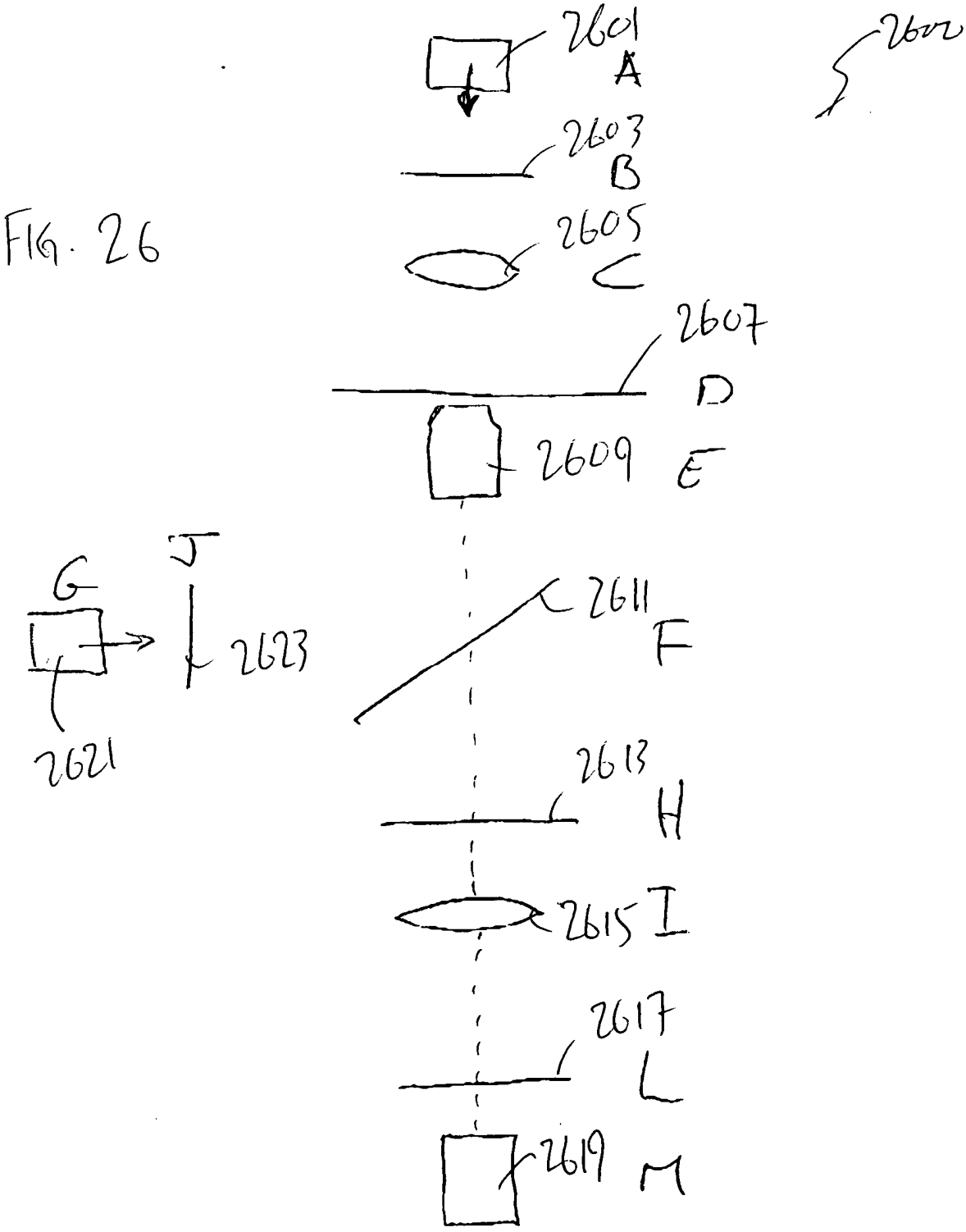
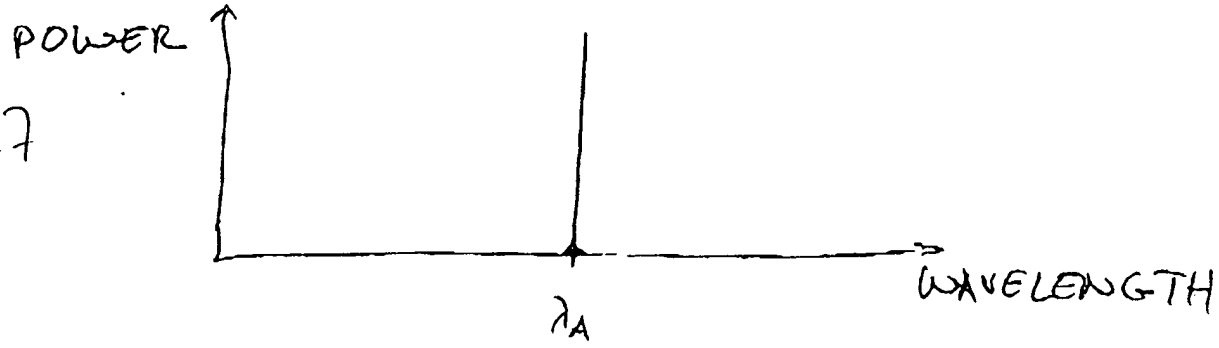


FIG. 26

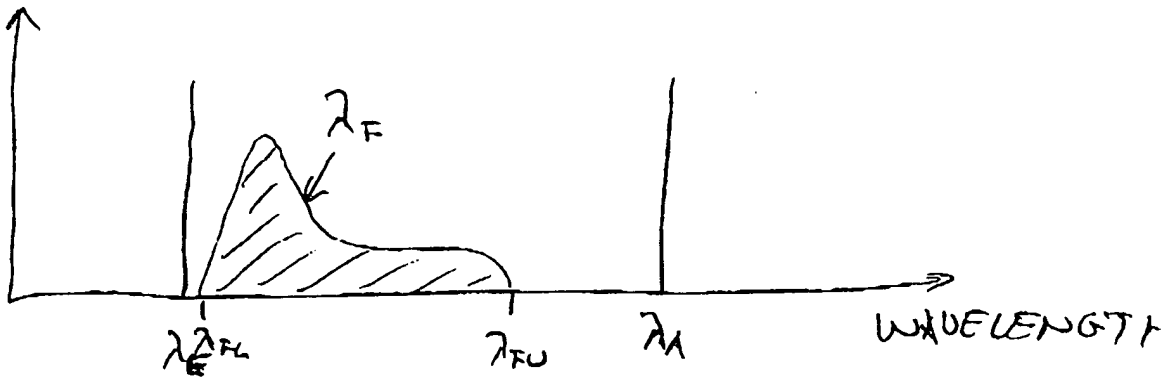
SPECTRUM OF AFM LASER

FIG. 27



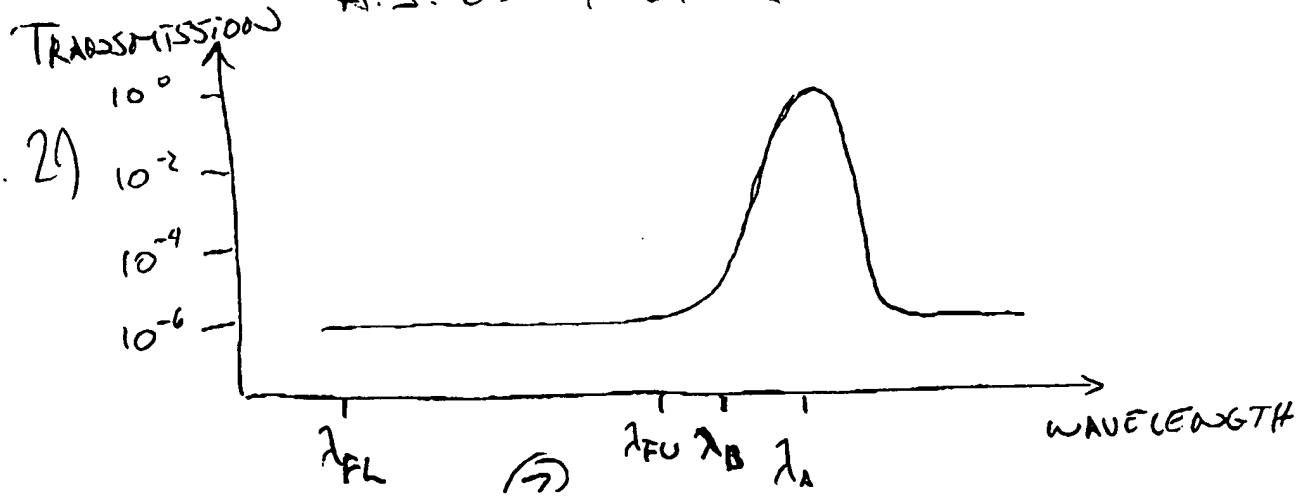
RELATIVE POSITIONS OF WAVELENGTHS OF INTEREST

FIG. 28



TRANSMISSION SPECTRUM OF A.S.E. FILTER

FIG. 29



TRANSMISSION SPECTRUM OF DICHROIC MIRROR

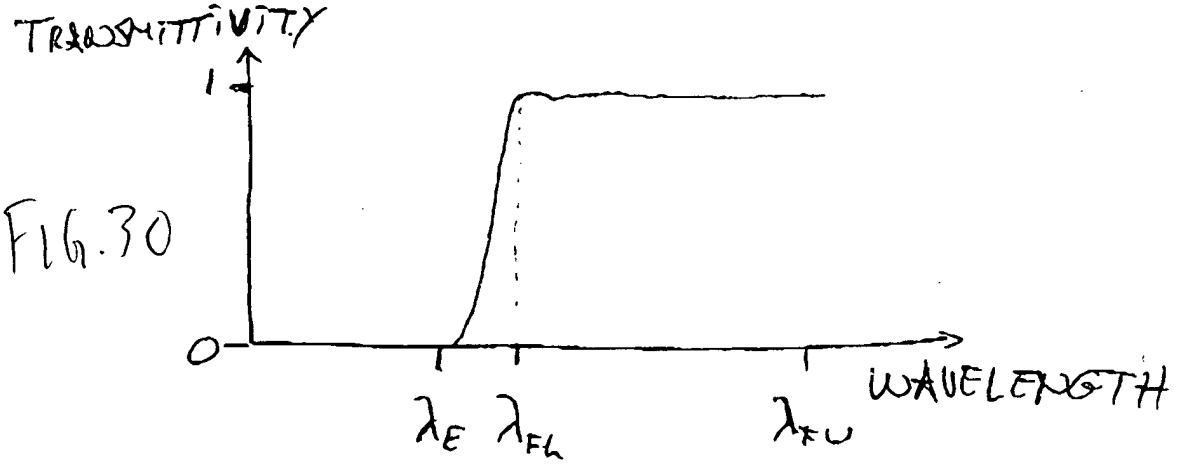


FIG. 30

TRANSMISSION SPECTRUM OF

BLOCKING FILTER FOR WAVELENGTH λ_A

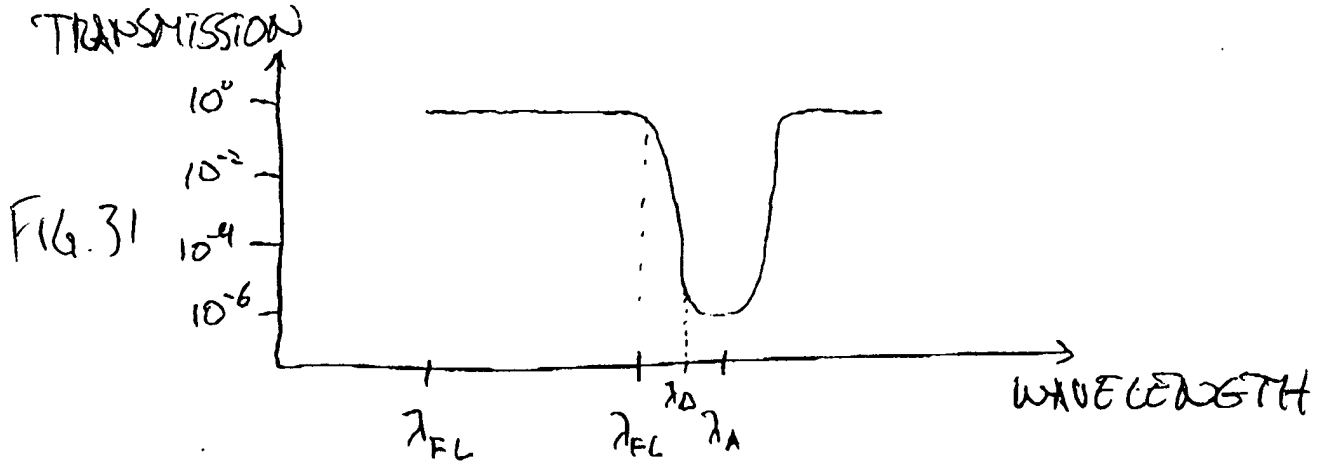


FIG. 31

SPECTRUM OF LASER FOR SAMPLE EXCITATION

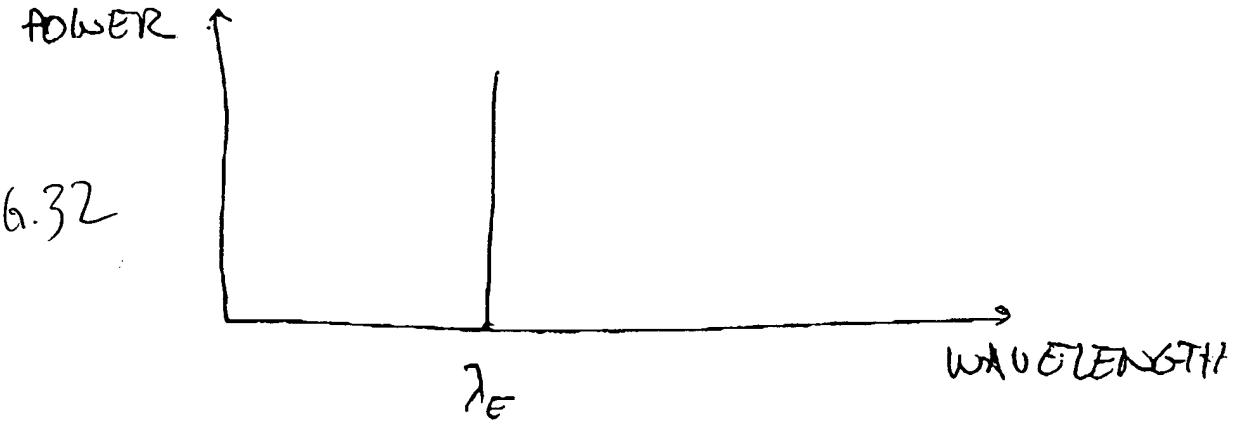


FIG. 32

TRANSMISSION SPECTRUM OF THE "EXCITATION CLEAN-UP FILTER"

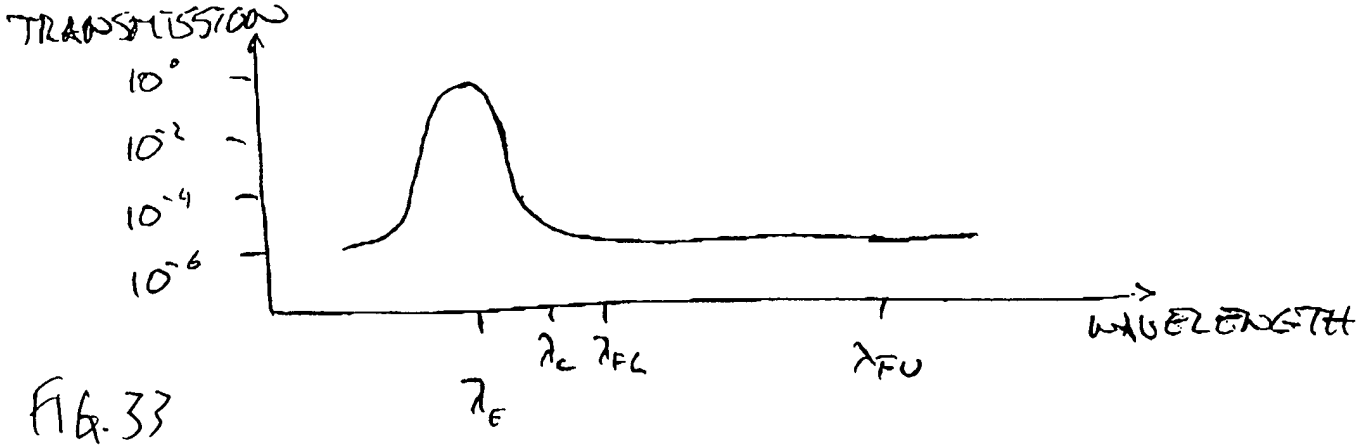


FIG. 33

TRANSMISSION SPECTRUM FOR

"BLOCKING FILTER FOR SAMPLE DETECTOR

FIG. 34